GOVERNMENT OF GHANA

ENVIRONMENTAL PROTECTION AGENCY

GHANA, AFRICA ENVIRONMENTAL HEALTH AND POLLUTION MANAGEMENT PROGRAM (AEHPMP)

FINAL

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR TINGA CLEAN MINE DEMONSTRATION CENTER (CMDC)

JUNE 2025

EXECUTIVE SUMMARY

Introduction and background

The informal, unsafe, and unregulated nature of mercury use in Artisanal Small-scale Gold Mining (ASGM) sector creates a legacy of severe adverse and irreversible environmental and health damage in its wake. It is therefore a priority to reduce, and where feasible, eliminate mercury use in ASGM as required in Article 7 of the Minamata Convention. Current crude methods of handling mercury to process gold lead to release of mercury into the environment with limited controls, leading to occupational and community exposures. For mercury abatement, technologies to promote phasing out of mercury usage has been proposed as part of the Africa Environmental Health and Pollution Management Program (AEHPMP), whose objective is to reduce exposure to mercury and regulate mercury use in ASGM. The focus will be on promoting alternative technologies for gold extraction without the use of harmful chemicals. Possible technologies to avoid the use of mercury in ASGM include sluicing, direct smelting, improved milling, shaking table, reactivation, centrifuges etc.

The Government of Ghana (GoG), acting through the Ministry of Environment, Science, Technology and Innovation (MESTI) and the Environmental Protection Agency (EPA), is implementing the AEHPMP with funds from the World Bank. The AEHPMP is being implemented by EPA where a Project Implementation Unit (PIU) has been established. To achieve the objectives of the project, the PIU has proposed to establish Clean Mine Demonstration Centers (CMDC) in four Small Scale Artisanal Gold Mining (ASGM) sites in Ghana namely Dakrupe and Tinga in Bole District of Savannah Region, Apinto/ Fanti Mines in Prestea Huni Valley District of Western Region and Tweapease of Birim North District of Eastern Region.

The GoG has acquired a 0.94 acre (0.38Ha) land at Tinga for the establishment of the Tinga CMDC. The site in reference is part of a larger parcel of land designated for the Tinga Community Mining Scheme. GoG acquired the land through a Voluntary Land Donation (VLD) made by the Tinga community, led by their Traditional Authority.

The donation has been subjected to the World Bank's VLD Protocol through which the community was duly informed about their right to refuse the donation and to be compensated for land so donated. No households were displaced as a result of the donation.

The CMDC in Tinga will be a masonry roofed blockwork/ concrete structure and will have the following:

- Provision of offices/washrooms/training spaces to cater for the anticipated number of people;
- Appropriate-sized washrooms have been provided to serve the anticipated population of users;
- Use of environmentally friendly materials;
- Use of energy-efficient materials and facilities; and
- Provision for water storage including harvesting of rainwater.

The CMDC at Tinga have been designed for air circulation and cross ventilation through the windows. Natural air circulation through the windows is allowed in order to eliminate or reduce the usage of mechanical ventilation systems. The CMDC in Tinga will be made of a masonry roofed blockwork office structure. The main facilities proposed for the Tinga CMDC includes the following:

- Demonstration Area (Processing Area and Smelting Area);
- Tailings Storage and Water Recycling Ponds Area;
- Office Rooms;
- Training Spaces (Indoor and Outdoor) and Eating Space;
- Storage Spaces;
- Visitor Amenities (Washrooms);
- Fencing; and
- Car Park

The site is a mining area with no water body close by and easily accessible although connecting roads are not engineered. The Environmental and Social (E&S) risks identified at the site include:

- Presence of some economic trees especially *Afzelia africana* and *Vitellaria paradoxa* that have to be cut;
- Development of access road to the site and impact on biodiversity; and
- Lack of water supply and electricity.

Alternative Considerations
The alternative analyses covered the following:
- Site Selection Option- the chosen site vis-à-vis other sites in Tinga;
- Choice of Building Materials for the Tinga CMDC- use of typical brick/block and mortar as against prefabricated containerized structures;
- Choice of Technology- use of a combination of comminution, gravimetric concentration and gold separation and to avoid mercury use through leaching and direct smelting; and
- Do nothing scenario- no CMDC is provided at Tinga and the status quo remains.

Construction Materials and Equipment
The materials required for the project include building materials such as cement, cement block, sand, gravel, stone chippings, concrete, iron rods, water, PVC/HDM pipes and admixtures. Other accessories will include barbed wire, wire mesh, balustrade, etc. The construction equipment to be used includes excavators, backhoes, shovels/ pickaxes, concrete mixers, haulage trucks, dump trucks, concrete dispensing trucks, water pumps etc.

Construction Labor
It is estimated that between 30 to 50 persons will be engaged during the construction phase of the Project's construction works. This will include unskilled labor, drivers, masons, carpenters, plumbers, electricians, mechanics, plant operators, engineers, and administrators. The Tinga community is endowed with youth who are currently unemployed and so will be available for employment as unskilled labor.

Skilled labor will be hired from outside the Tinga community and risks such as social conflict, increased Sexually Transmitted Diseases (STDs) and gender-based violence may occur. In this regard, adequate measures have been provided in this ESMP including Code of Conduct to regulate the conduct of the contractor and their labor force to ensure the risks associated with labor from outside the project location are minimized. Labor camps will not be established to house workers during construction, rather the workers will go to their various homes and proceed from there to work.

In line with environmental permitting requirements as provided under the Environmental Assessment Regulations of 1999, Legislative Instrument (LI) 1652, the AEHPMP PIU commissioned the preparation of this ESMP to guide the environmental and social risk management associated with the construction and operation of the Tinga CMDC. This report is therefore the Final ESMP in compliance with the World Bank Environmental and Social Standards (ESSs) especially ESS 1 on Assessment and Management of Environmental and Social Risks and Impacts.

Objective and Purpose of the ESMP
The purpose of the ESMP is to provide guidance for the environmental and social risk management associated with the construction and operation (including maintenance) of the CMDC at Tinga.

Relevant Policies, Legal and Administrative Framework
The proposed Project will strictly adhere to and follow the World Bank's Environmental and Social Framework (ESF) as well as the legal and regulatory frameworks of Ghana. The key environmental policies, legal framework and procedures considered as relevant under the proposed Project have been presented in Chapter 2 of this ESMP. The proposed construction and operation of the Tinga CMDC is expected to comply with the requirements of the following EPA administered Ghana Standards (GS):

1. GS 1236:2019- Environment and Health Protection – Requirements for Ambient Air Quality and Point Source/ Stack Emissions;
2. GS 1222:2018- Health Protection – Requirements for Ambient Noise Control; and
3. GS 1212:2019- Environmental Protection Requirements for Effluent Discharge (General Industry).

Ghana Environmental Assessment Regulations 1999 (LI 1652): Under the provisions of the Ghana Environmental Assessment Regulations 1999 (LI 1652), the proposed Project is classified under projects for which an EIA is required. The EPA Act 490 (1994) established the Agency and entrusted it with the responsibility of ensuring compliance with the EIA process and procedures in the planning and execution of development projects.

World Bank Environmental and Social Framework: The construction and operation of the Tinga CMDC is World Bank Funded and therefore must also conform to the World Bank's ESSs which govern the funding agreement between the Bank and the Government of Ghana. The objective of the standards is to prevent or at least minimize biophysical environment and socioeconomic-cultural risks and impacts while increasing the environmental and the socio-economic benefits of projects. The applicable ESSs are as follows:

- ESS 1: Assessment and Management of Environmental and Social Risks and Impacts;
- ESS 2: Labor and Working Conditions;
- ESS 3: Resource Efficiency and Pollution Prevention and Management;
- ESS 4: Community Health and Safety;
- ESS 5: Land Acquisitions, Restrictions on Land Use, and Involuntary Resettlement;
- ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- ESS 8: Cultural Heritage; and
- ESS 10: Stakeholder Engagement and Information Disclosure.

Stakeholder Consultations

Key stakeholders have been consulted, these include regulatory bodies, local government institutions and project affected persons and community. Stakeholder consultation is a continuous process and would be conducted throughout project implementation.

The following are key highlights of the issues/concerns raised by stakeholders/affected persons during the consultations:

- Some community members/ miners had doubts that the Project will see the light of day.
- The miners expressed concern about whether the CMDC will be able to process all the ore mined in Tinga.
- Aside the CMDC to be established, miners also require implements such as water pumps, PPEs at the mine shafts to be able to increase ore production and to ensure their safety.
- The executive of the Tinga Community Mine requires support in extending electricity to the site to ensure increased production of the gold ore.
- The miners are aware of the mercury problem and are eager to support the Project at Tinga to succeed.

Potential Environmental and Social Risks and Impacts of the Tinga CMDC

The potential beneficial and adverse impacts of the Tinga CMDC Project have been identified and discussed based on the nature of the Project and area of influence.

The potential positive impacts of the project include:

- Awareness creation on impacts and risks of mercury use in ASGM in Tinga;
- Employment creation and enhanced business opportunities in ASGM in Tinga;
- Deepening of construction health and safety education and awareness in Tinga;
- Improved institutional capacity and coordination in the ASGM sector;
- Enhanced image of Tinga as a model mercury free mining community;
- Improved health of miners and community members; and
- Improvement in local and national economy.

The key adverse environmental and social issues which could possibly arise from the various stages of the Project have been evaluated and presented in Chapter 5 of this document.
They include:

- Air quality deterioration and exposure of some community members to the particulates;
- Vibration and noise nuisance;
- Loss of vegetation/ habitat and impacts on flora and fauna;
- Land degradation and loss of soil resources at the Tinga CMDC;
- Impact of bush fires;
- Exposure of workers to noise, dust, odor and workplace accidents e.g., slips, falls etc. as an occupational health and safety issue;

- Exposure of some community members to noise, dust and accidents involving construction vehicles as a public safety and health concern;
- Increased risk of Sexually Transmitted Diseases; and
- Gender based violence including sexual harassment, child abuse and exploitation due to labor influx.

Proposed Enhancement and Mitigation Measures for Potential Environmental and Social Risks and Impacts Identified

The Proposed Environmental and Social Management and Monitoring Plan (ESMMP) which aims to ensure that the potential environmental and social risks and impacts identified are reduced to the barest minimum, or completely eliminated during pre-construction, construction, operation and decommissioning phases of the proposed Project at Tinga is presented in Chapter 6 of the ESMP document. To ensure effectiveness and compliance with sound environmental and social practices and ensure sustainability of the Tinga CMDC, a provisional environmental and social management and monitoring program to help manage and monitor the risks and impacts and which will help sustain environmental quality within acceptable guidelines/standards, including monitoring roles and responsibilities have been provided in the ESMP. The programme includes a proposed Monitoring Plan for monitoring the effectiveness of the implementation of each of the management measures.

Grievance Redress

A grievance resolution procedure consistent with the EPA's GRM has been provided in this ESMP. It aims at addressing and resolving grievances or complaints from Project Affected Persons (PAPs) promptly, fairly and in a manner to the extent possible, acceptable to all parties during the proposed Project implementation.

Capacity Building Plan

All relevant stakeholders including contractors and their workers, the Bole District Assembly, AEHPMP - PIU staff, community opinion leaders, NGOs, project affected persons etc. who will be involved in the implementation, monitoring and supervision of the Project implementation will undergo training to create understanding on the ESMP requirements, the roles and responsibilities of the stakeholders in order to ensure compliance with the ESMP.

Estimated Cost for the ESMP Implementation

The costs involve:

i. Implementation of the environmental and social impacts mitigation measures is estimated to cost GHS694,500.00 (this cost excludes some of the mitigation management costs already included in the BoQs).
ii. Monitoring of the mitigation measures implementation is estimated to cost GHS569,000.00 (this cost excludes some of the mitigation management costs already included in the BoQs)
iii. Capacity Building including Grievance Redress: GHS1,170,000.

Conclusion

The intervention, a community-focused cleaner technology seeks to address current policy challenges as well as to strengthen regulatory frameworks and facilitate their implementation, to better address environmental health risks associated with mercury use in ASGM sector.

The proposed establishment of a CMDC at Tinga is to assist in eliminating mercury exposure and use in ASGM and improve the health risks and effects associated with mercury in the community and Ghana as a whole. Mercury is a known neurotoxin with high exposures linked to some health challenges including kidney and autoimmune dysfunction.

The various stages in the existing Tinga ASGM activities have some environmental and social risks and impacts which the proposed CMDC seeks to address, which also has some impacts albeit minor. This ESMP therefore seeks to provide mitigation and management measures to realize the benefits from the intervention while eliminating any cumulative impacts.

The studies towards the preparation of this ESMP has revealed that the execution of the CMDC at Tinga will not impact negatively on the existing environmental, social, safety and health conditions of the community.

Table of Contents

List of Tables

List of Figures

List of Plates

LIST OF ABBREVIATIONS

ADR	Alternative Dispute Resolution
AEAs	Agriculture Extension Agents
AfDB	African Development Bank
AEHPMP	African Environment Health Pollution Management Program
AIDS	Acquired Immune Deficiency Syndrome
AoI	Area of Influence
AER	Annual Environmental Report
APHA	American Public Health Association
ASM	Artisanal Small Scale Mining
ASGM	Artisanal Small-Scale Gold Mining
AWWA	American Water Works Association
BOP	Business Operating Permit
BoQs	Bill of Quantities
BP	Bank Policy
CBD	Convention on Biological Diversity
C-ESMP	Contractor's Environmental and Social Management Plan
CHPS	Community Health-Based Planning Services
CMDCs	Clean Mine Demonstration Centers
COVID-19	Corona Virus Disease of 2019
CPESDP	Coordinated Programme of Economic and Social Development Policies
CSIR	Council for Scientific and Industrial Research
EAP	Emergency Assembly Point
EHS	Environment, Health and Safety
SHS	Environment, Social, Health and Safety
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
EMP	Environmental Management Plan
ESF	Environmental and Social Framework
ESCP	Environmental and Social Commitment Plan
ESHS	Environment, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management Monitoring Plan
ESS	Environmental and Social Standard
FDI	Foreign Direct Investment
FGD	Focus Group Discussion
GBV	Gender Based Violence
GDP	Gross Domestic Product
GEF	Global Environment Facility
GES	Ghana Education Service
GHG	Green House Gas
GHS	Ghana Health Service
GIIP	Good International Industry Practice

GNCCP	Ghana National Climate Change Policy
GNFS	Ghana National Fire Service
GoG	Government of Ghana
GRM	Grievance Redress Mechanism
GS	Ghana Standard
GSA	Ghana Standard Authority
GSS	Ghana Statistical Service
HIV	Human Immunodeficiency Virus
I&APs	Interested and Affected Parties
ICT	Information and Communication Technology
ILO	International Labor Organization
IPF	Investment Project Financing
ITB	Inter Tropical Boundary
ITCZ	Inter Tropical Convergence Zone
JHS	Junior High School
KID	Key Informant Discussion
KII	Key Informant Interview
KPI	Key Person Interview
KVIP	Kumasi Ventilated-Improved Pit
LC	Lands Commission
LI	Legislative Instrument
LMP	Labor Management Procedures
LUSPA	Land Use and Spatial Planning Authority
LVD	Lands Valuation Division
MC	Minerals Commission
MESTI	Ministry of Environment, Science, Technology and Innovation
MID	Mines Inspectorate Division
MMDA	Metropolitan, Municipal and District Assembly
MLGDRD	Ministry of Local Government, Decentralization and Rural Development
MoFA	Ministry of Food and Agriculture
MOP	Mining Operating Plan
NDCs	Nationally Determined Contributions
NEAP	National Environment Action Plan
NEDCo	Northern Electricity Distribution Company
NEP	National Environment Policy
NEmP	National Employment Policy
NGOs	Non-Governmental Organizations
NHP	National Health Policy
NLP	National Labor Policy
NWP	National Water Policy
OASL	Office of Administrator of Stool Lands
OP	Operational Policy
OSH	Occupational Safety and Health
PAP	Project Affected Person
PIU	Project Implementation Unit
PNDC	Provisional National Defense Council
PNDCL	Provisional National Defense Council Law
POPs	Persistent Organic Pollutants
PPEs	Personal Protective Equipment
PWDs	Persons with Disabilities
RBZP	Riparian Buffer Zone Policy
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SDGs	Sustainable Development Goals
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SGBV	Sexual and Gender Based Violence
SH	Sexual Harassment
SHS	Senior High School
SPSS	Statistical Package for Social Sciences
STD	Sexually Transmitted Diseases
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UPOPs	Unintentional Persistent Organic Pollutants
UNFCCC	United Nations Framework Convention on Climate Change

VAC	Violence Against Children
VLD	Voluntary Land Donation
WB	World Bank
WBG	World Bank Group
WC	Water Closet
WEF	Water Environment Federation
WHO	World Health Organization
WRI	Water Research Institute

1.0 INTRODUCTION

1.1 Background

The mining sector plays a vital role in the Ghanaian economy, attracting more than half of all Foreign Direct Investment (FDI), and generating more than one-third of all export revenues. The mining industry is the largest tax-paying sector in the country and makes a significant contribution to GDP and employment.

As a low-tech, labor-intensive industry with few barriers to entry, ASGM has become an alluring alternative livelihood for some Ghanaians especially the unemployed youth. Despite the financial benefits, a variety of environmental, social and public health concerns have accompanied the expansion of ASGM in Ghana and they include water contamination, inhalation of dust from pulverized ore, and exposure to mercury and other heavy metals.

The informal, unsafe, and unregulated nature of mercury use in ASGM Sector creates a legacy of severe adverse and irreversible environmental and health damage in its wake. It is therefore a priority to reduce, and where feasible, eliminate mercury use in ASGM as required in Article 7 of the Minamata Convention. Current crude methods of handling mercury to process gold lead to release of mercury into the environment with limited controls, leading to occupational and community exposures. For mercury abatement, technologies to promote phasing out of mercury usage has been proposed as part of this project under the Africa Environmental Health and Pollution Management Program (AEHPMP), whose objective is to reduce exposure to mercury and regulate mercury use in ASGM. The focus will be on promoting alternative technologies for gold extraction without the use of harmful chemicals. Possible technologies to avoid the use of mercury in ASGM include sluicing, direct smelting, improved milling, shaking table, reactivation, centrifuges etc.

Ghana is one of five African countries participating in the Global Environment Facility (GEF) funded AEHPMP. The Project in Ghana has four (4) Components as follow:

Component 1: Institutional Strengthening, Capacity Building and Knowledge Sharing
The component will strengthen the knowledge and capacity base of public institutions and private stakeholders to address environmental health risks associated with mercury use in ASGM sector and Persistent Organic Pollutants (POPs)/ Unintentional POPs (UPOPs) releases from e-waste.

Component 2: Support Policy Dialogue and Regulatory Enhancements
The component seeks to address current policy challenges as well as to strengthen regulatory frameworks and facilitate their implementation, to better address environmental health risks associated with mercury use in ASGM sector and POPs/UPOPs releases from e-waste. It complements activities under component 3, focused on operational-level approaches to incentivize practices and technologies less harmful to human health and the environment.

Component 3: Demonstrating the Application of Technological Tools and Economic Approaches
This component finances specific community-focused cleaner technology demonstration activities in contaminated areas, selected and designed based on environmental health risks and cost-effectiveness of interventions. The objective is to address technical and methodological challenges to the adoption and deployment of cleaner technologies and practices in complement to activities under component 2, which focuses on challenges and policy incentives to reduce environmental and health pressures.

Component 4: Project Management
This component covers the cost for project management, implementation and supervision of project activities, administration of procurement and financial management, monitoring and evaluation, and monitoring of safeguards compliance. The component covers in particular the cost of the Project Implementation Units (PIU) within the EPA.

The project's geographical scope covers all of Ghana however the establishment of the CDMCs at the four small scale mining locations are in three districts and three regions of Ghana as shown in **Table 1-1** and further illustrated in **Figure 1-1**.

Table 1-1: Selected Regions and Districts for AEHPMP Project

No.	Name of Site	District	Region
1.	Dakrupe	Bole	Savannah
2.	Tinga	Bole	Savannah
3.	Tweapease near New Abirem	Birim North	Eastern
4.	Fanti Mines at Abosso	Prestea Huni Valley	Western

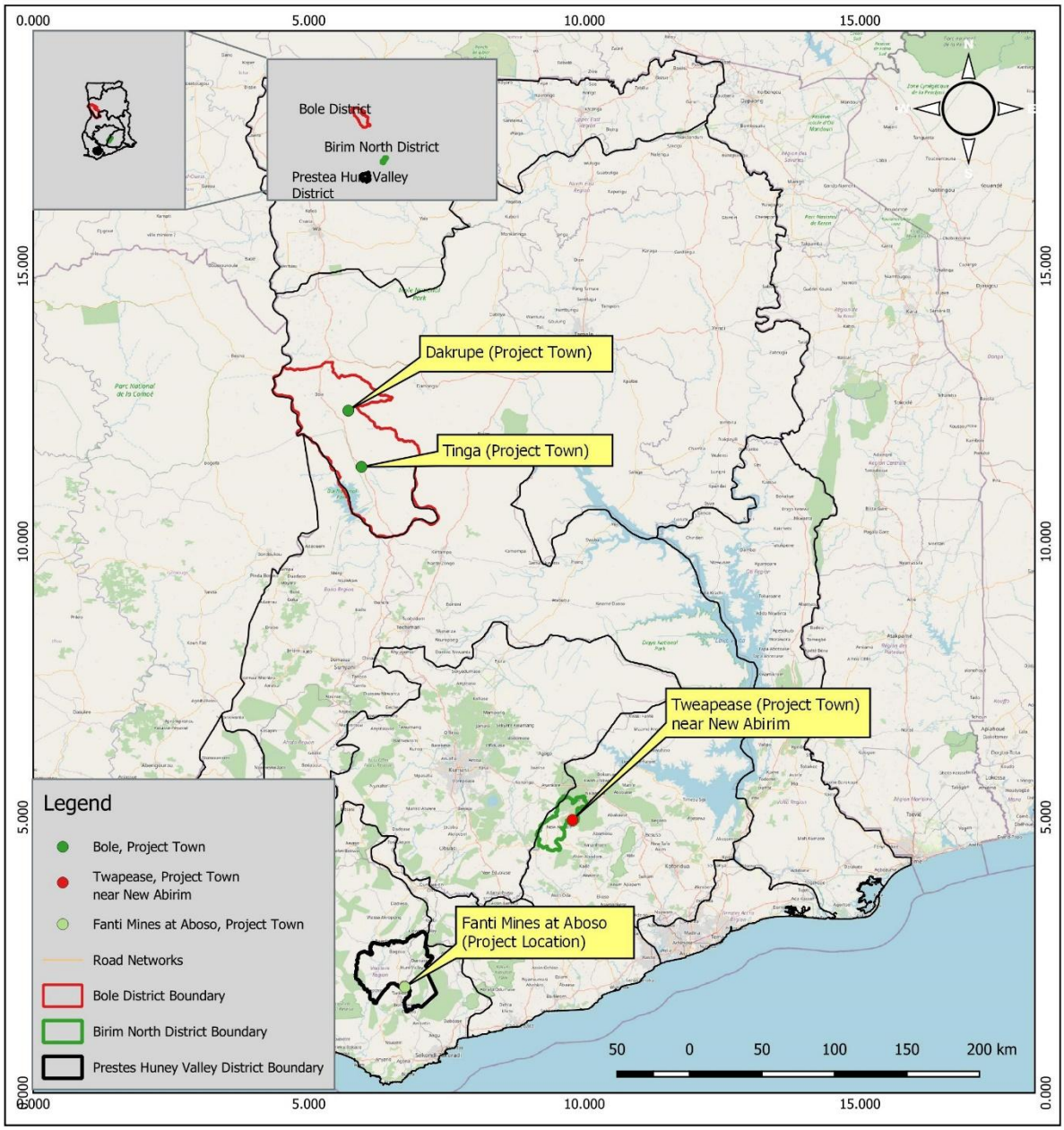


Figure 1-1: Map of Ghana Showing Proposed Project Locations

1.2 Description of the Proposed Project in Tinga

1.2.1 The Tinga CMDC

The land for the Tinga CMDC is 0.94 acres.This land, along with access roads to the site, is part of a larger parcel of land designated for the Tinga Community Mining Scheme. The designation of a place for Community Mining Schemes (CMS) is done by the Minerals Commission of Ghana, in close

consultation and involvement of relevant Traditional Authorities, District Assembly representatives and community people. In practice, such designated areas are free from any other uses and encumbrances, including farming activities. The land has been acquired by the GoG through a Voluntary Land Donation (VLD) arrangement with the Tinga community through the Traditional Authority. The–donation process followed the World Bank's VLD Protocol through which it was confirmed that the donation was not coerced and that the owners (Tinga community) finalize the donation after they were duly informed about their right to refuse the donation and to be compensated for land so donated. No households were displaced by the donation. The facility will be made up of the following:

- built up spaces;
- parking area;
- landscaping area; and
- circulation- internal and external and services distribution.

The design of the CMDC at Tinga will have the following:

- Provision of offices/washrooms/training spaces to cater for the anticipated number of people;
- Appropriate-sized washrooms have been provided to serve the anticipated population of users;
- Use of environmentally friendly materials;
- Use of energy-efficient materials and facilities; and
- Provision for water storage including harvesting of rainwater.

The CMDC at Tinga have been designed for air circulation and cross ventilation through the windows. Natural air circulation through the windows is allowed in order to eliminate or reduce the usage of mechanical ventilation systems. The CMDC in Tinga will be made of a masonry roofed blockwork office structure.

The design of the CMDC at Tinga embodies a play of light, patterns and shades. The overall internal color scheme is proposed to be one which will reflect good lighting system. Consideration for the finishes has been based on functionality of space, durability and maintenance. Acrylic emulsion paint which allows good lighting system has been adopted.

The washroom areas will be tiled and the immediate environs of the buildings will be enhanced by the introduction of aprons and drains around the facilities.

The main facilities proposed for the Tinga CMDC includes the following:

- Demonstration Area (Processing Area and Smelting Area);
- Tailings Storage and Water Recycling Ponds Area;
- Office Rooms;
- Training Spaces (Indoor and Outdoor) and Eating Space;
- Storage Spaces;
- Visitor Amenities (Washrooms);
- Fencing; and
- Car Park.

<u>Demonstration Area (Processing Area and Smelting Area)</u>

The section demarcated as demonstration area will be for both processing of the ores and for smelting of the gold. The demonstration area is designed to process the daily tonnage of materials according to the technology assessment at the mine. The average tonnage of materials to be processed is estimated at 1.5 - 5t/da. The processing area will house the mercury-free technology equipment. It will serve for both practical demonstrations of the clean gold processing techniques and provide support services to miners especially women involved in ore processing. The smelting area will house the smelter, the last component of the process flow chart where the final product of the processing is done to obtain the gold ore through direct smelting (semi refined gold). The demonstration area will basically have sheds without

enclosed walls to provide sun and rain shades for the equipment and workers during the processing. It will be without enclosed walls to allow for proper ventilation and to minimize dust pollution.

Figure 1-2 shows the environmentally based process flow diagram of the gold production processes of winnowing, cyanidation and direct smelting.

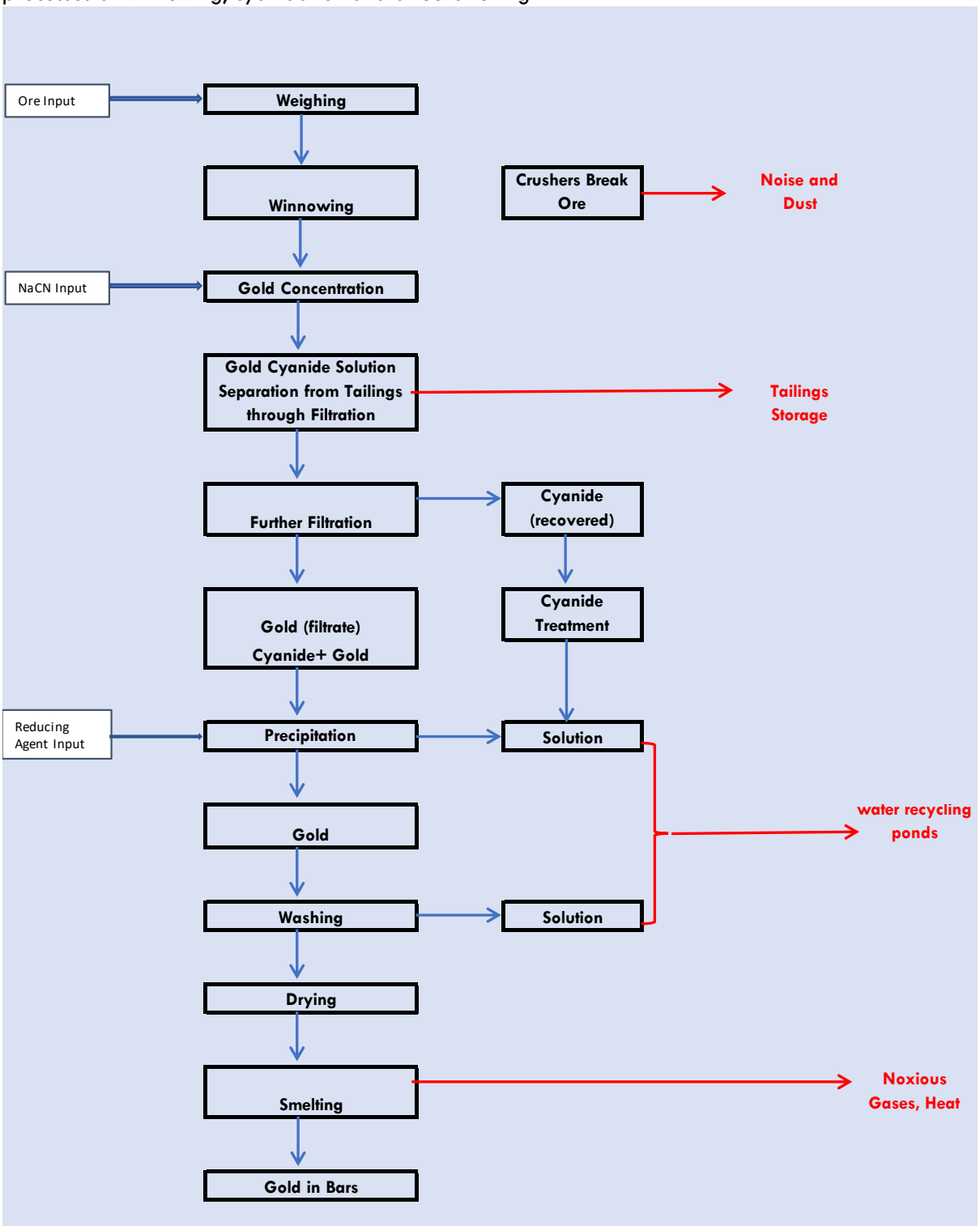


Figure 1-2: Environmentally Based Process Flow Diagram of the Gold Production Processes

Tailings Storage Facility and Water Recycling Ponds Area

Practical demonstration of the mercury-free gold processing techniques would need water (which is often scarce in the small-scale mining sites) and lead to production of tailings. An effective impoundment/TSF will serve the purpose of recycling the processed water and to contain the tailings produced during the demonstration.

An area is allotted for Tailings storage and the construction of water recycling ponds. It is proposed to provide the Tinga site with a borehole for process water supply purposes.

Office Rooms

The Tinga CMDC will be of a masonry roofed blockwork office.

The masonry roofed blockwork office will consist of a concrete strip foundation, rendered masonry block walls as external and internal envelope, concrete columns and beams, roofing sheeting, ceiling, painting, wooden doors, aluminum glazed windows, electrical and air-conditioning installations. This is proposed because of the ready availability of the above materials.

The office spaces will be required for administering training and for the daily operation of the center. An office space of dimension 5m (length) by 2m (width) by 2.2m (height) will be provided. Office staff of four (4) persons have been considered for the operation of the center although the space allotted for the office can contain approximately eight (8) office staff. The office will have standard desks, high back chairs, stackable chairs, filing cabinets, exhibit boards and white boards.

Training Facility

Training spaces will also be required to do workshops for miners, the public, students etc. The proposed dimension of the space that will be adequate is 12m (length) x 2.2m (width) x 2.2m (height) to be able to house a maximum number of forty (40) people at a time for training. The training spaces will also typically have folding chairs, tables where required, whiteboards, exhibit boards, and an image projector.

An outdoor training area for demonstration will be constructed. It will be in a tent form with timber posts as the main structural supports bolted on concrete slab and roofed with aluminum roofing sheets of 50mm x 100mm timber rafters and purlins. It will have an external envelope made of 25mm x 50mm wooden battens spaced 100mm apart to enhance ventilation. The overall dimension proposed is 10m (length) x 5m (width) x 4m (height). The outdoor training area will also serve as a resting and eating area for the non-office staff and shall have benches and tables.

Storage Spaces, Kitchenette and Visitors Amenities

The size of the storage space and kitchenette combined shall be blockwork with room size 5.5m (length) x 2.2m (width) x 2.2m (height). However, there will be some flexibility of modifications during the detailed design stage.

Fencing

For maximum security against theft and other damages due to external factors, a barbed wire fencing will be provided for the Tinga CMDC for additional security against vandalism.

Construction and Operation and Maintenance Periods

It is expected to use 6 months for the construction works while the Operation and Maintenance will continue throughout the life of the mines supplying the CMDC at Tinga.

A general block plan for the CMDC at Tinga is as shown in **Figure 1-3**.

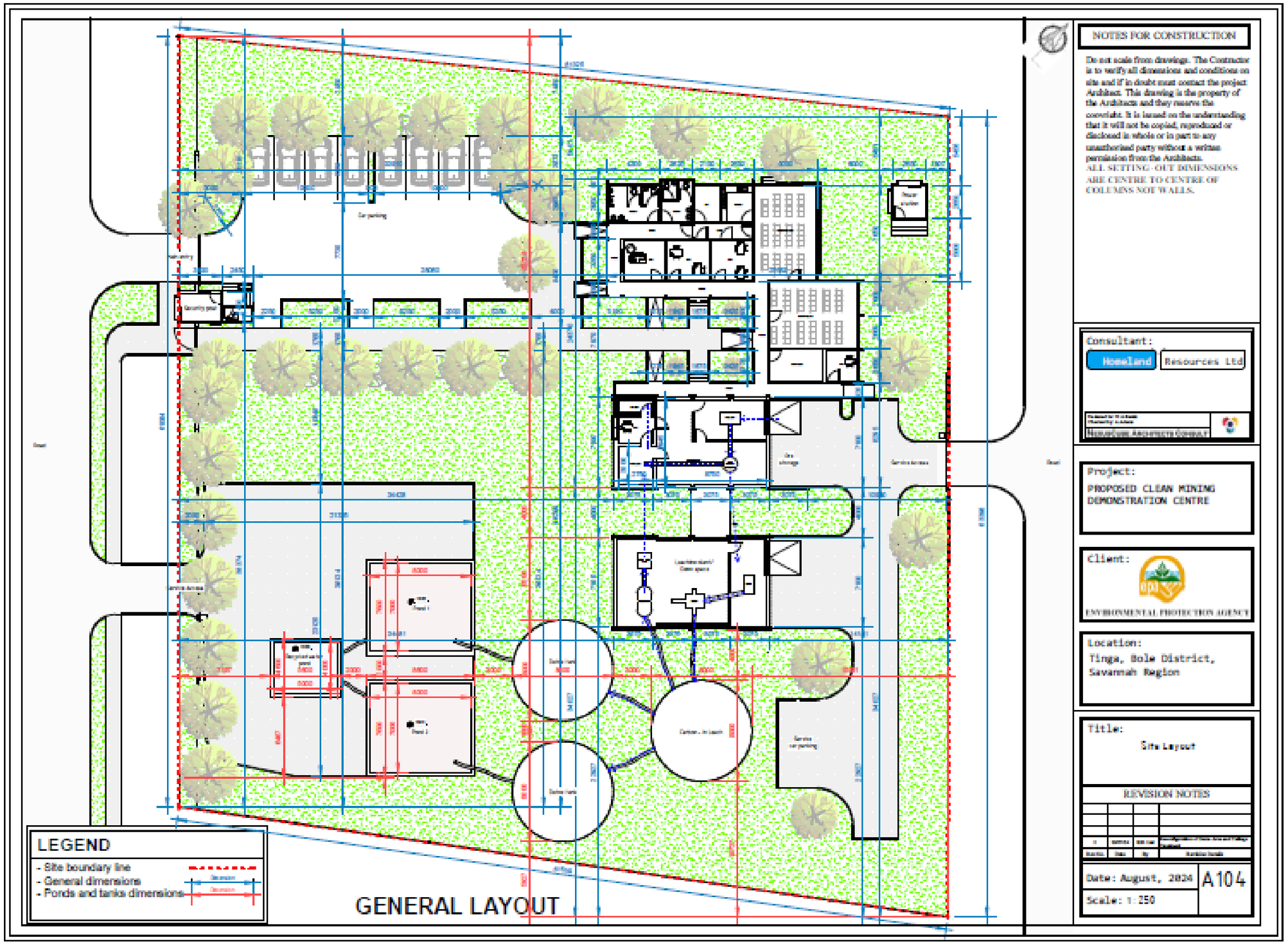


Figure 1-3: General Layout of the Tinga CDMC

1.2.2 Sources of the Ore at Tinga

The sources of the ore at Tinga is from one site popularly referred to as Wenchi-Wenchi but subdivided into East and West. The mining locations at Tinga is shown in **Figure 1-4.**

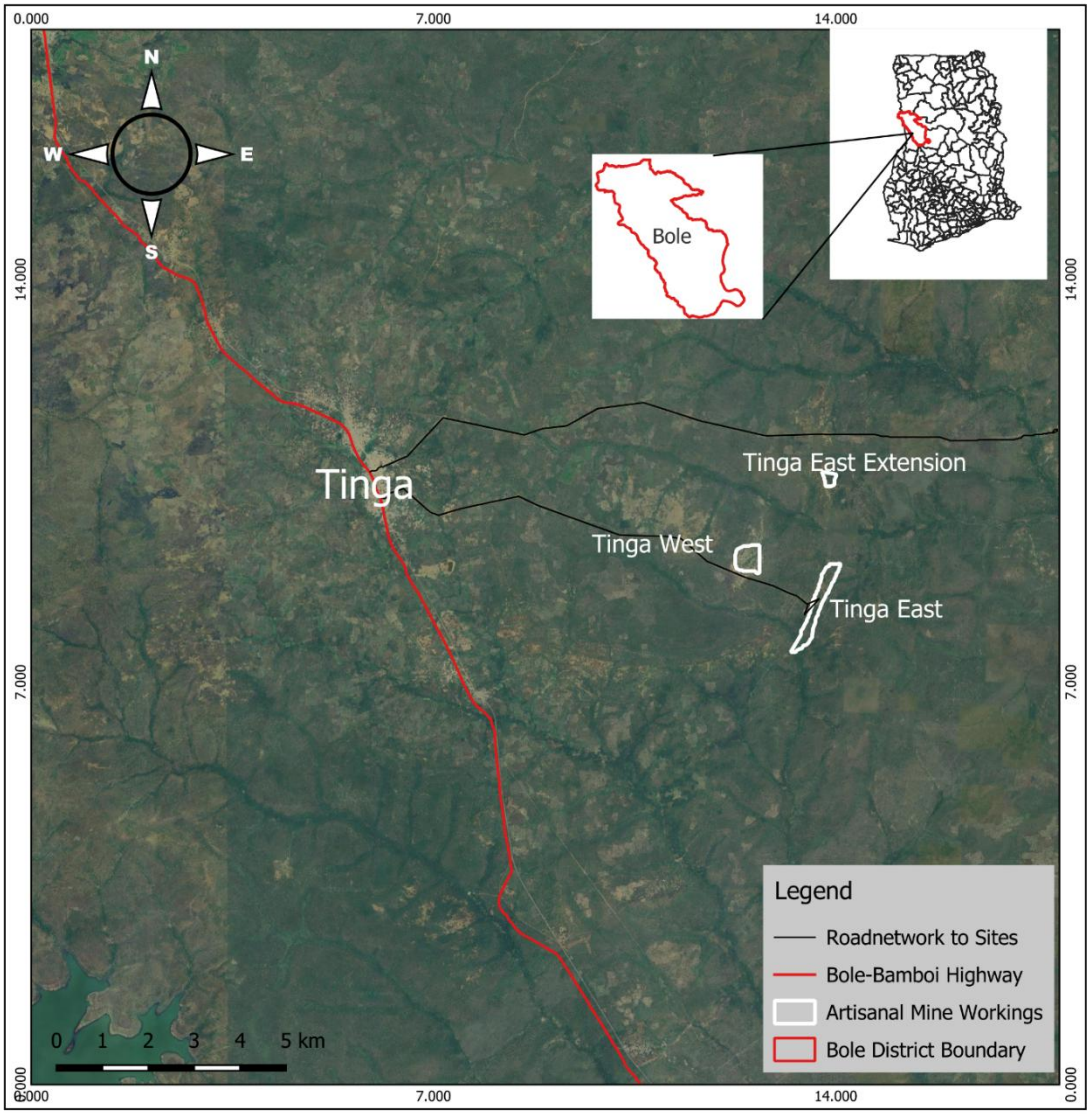


Figure 1-4: Approximate Mining location at Tinga

<u>The Tinga East and West Mining Areas</u>

The East and West areas were actively being mined legally, with the observation of compressors in operation. The East hosts the main pit and they are not connected to the national electricity grid. It was observed that both the waste and ore piles contain granitoids, metavolcanics, and quartz veins (**see Plate 1-1**). These rocks appear sheared and brecciated. According to explanations provided by some of the miners, any of the rock types at this mining site could contain good gold grades. It is easy to misclassify a mineralized rock as waste, as gold is not associated with only one rock type.

(a) Rock Types at Main Pit Site

(b) The Shaft at the Main Pit Site

Plate 1-1: Scenes of the Main Pit Area

1.2.3 Current Milling and Gold Processing Practices

The crushing, milling and gold extraction facilities are situated at a valley close to the main mining pit. It was observed that there were no residential facilities close to this area, which may require relocation or farms to be destroyed. **Plate 1-2** depicts the crushing and gold extraction facility, with some ore awaiting crushing (a) – crushing the ore before milling and extraction of the gold with mercury (b), while **Figure 1-5** shows the environmentally based milling and gold extraction process at Tinga.

(a) Crushing the Ore

(b Extracting the Gold

Plate 1-2: Scenes from the Ore Processing Area

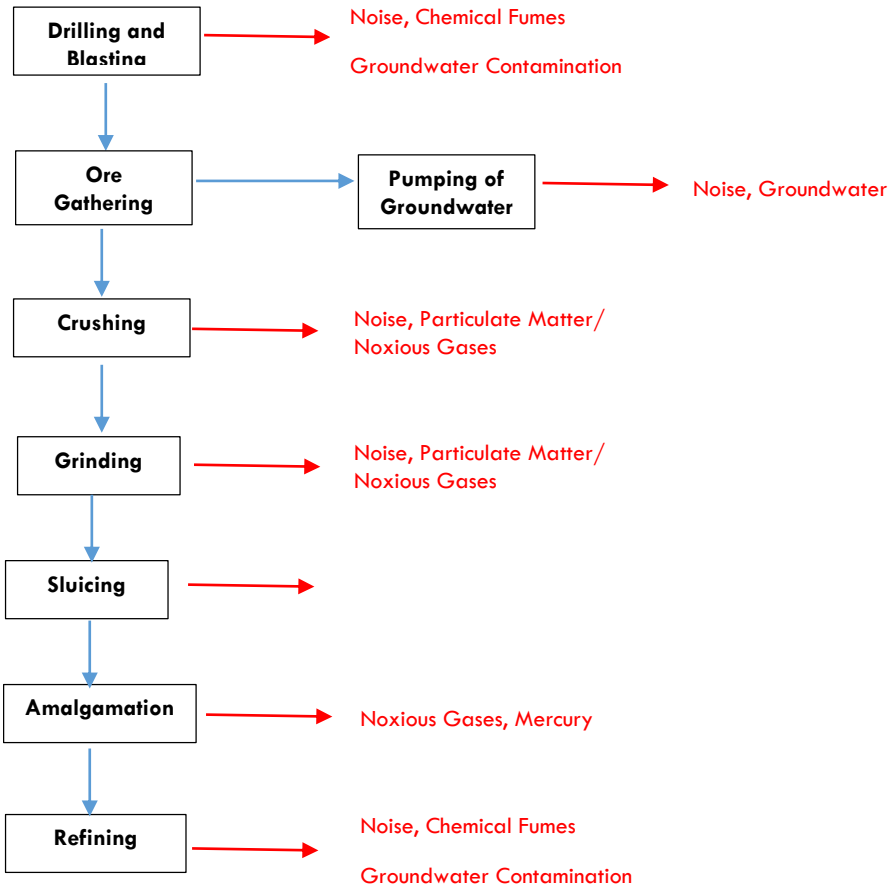


Figure 1-5: Environmentally Based Process Flow Diagram of the Mining and Ore Processing at Tinga

1.2.4 Construction Materials and Equipment

The construction materials will include building materials such as cement, cement block, sand, gravel, stone chippings, concrete, iron rods, water, PVC/HDM pipes and admixtures. Other accessories will include barbed wire, wire mesh, balustrade, etc. The construction equipment to be used includes excavators, backhoes, shovels/ pickaxes, concrete mixers, haulage trucks, dump trucks, concrete dispensing trucks, water pumps etc.

1.2.5 Construction Labor

It is estimated that between 30 to 50 persons will be engaged during the construction phase of the Project works. This will include unskilled labor, drivers, masons, carpenters, plumbers, electricians, mechanics, plant operators, engineers, and administrators. Although the Tinga community is endowed with youth who are currently unemployed and so will be available for employment as unskilled labor, use of skilled labor from outside of the community and associated risks such as social conflict, increased sexually transmitted diseases (STD, HIV/AIDs) and gender-based violence may occur. In this regard, adequate measures have been provided in this ESMP including Code of Conduct to regulate the conduct of the contractor and their labor force to ensure the risks associated with labor from outside the project location are minimized. Labor camps will not be established to house workers during construction, rather the workers will go to their various homes and proceed from there to work.

During the operational and maintenance phase, the project plans to engage between 4-8 persons who will be responsible for maintenance.

1.3 Justification for the Project

The ASGM sector predominantly deals with underground hard rock ores, which is the case at Tinga.

For the ore at Tinga, the method of extracting the gold include crushing and milling as a prerequisite to further processing. Typical equipment observed in the processing include disc mills (modified corn mills). The milled material is mixed with water and sluiced to obtain a gold concentrate. The gold concentrate obtained after sluicing is further concentrated through panning, followed by gold extraction by amalgamation i.e., the use of mercury for gold extraction from concentrate. The tailings generated after sluicing are stockpiled at the processing center and sold to others including some Chinese or companies from Burkina Faso for further processing.

1.4 Purpose and Objectives of the ESMP

The purpose of the ESMP is to provide guidance for the environmental and social risk management associated with the construction, operation and decommissioning of the CMDC at Tinga when completed. It provides adequate mitigation and management measures to eliminate and mitigate significant adverse environmental and social impacts, thereby reducing them to acceptable levels. The ESMP document defines roles, responsibilities, and procedures to guide implementation of the activities, in compliance with the World Bank and National requirements.

The specific objectives of the ESMP are to:

- Identify significant adverse environmental and social impacts, conflicts and concerns likely to arise as a result of the implementation of the project;
- outline mitigating/enhancing, monitoring, consultative and institutional measures for managing adverse environmental and social impacts and risks or to enhance the beneficial impacts; and
- address capacity-building requirements needed to strengthen key institutional stakeholders as well as affected local groups or communities' environmental and social capacities.

1.5 Scope of Work

The scope of work comprised the following:

1. Baseline studies at the Tinga Project sites involving the collection and analysis of information on the land, water, air and the social environments, and with emphasis on the Project Area of Influence (AoI). It consisted of the following activities:
    - desk studies to review project information and understand the scope of the proposed intervention while undertaking a gap assessment;
    - desk surveys to obtain secondary data and develop field survey tools for compiling information on the environmental and social features/ characteristics of the proposed site;
    - sites surveys to identify the project area of influence and issues of urgent environmental concern related to the proposed development and peculiarities of the existing environment;
    - sampling of environmental media – air, water and land;
    - laboratory analyses for relevant physico-chemical and bacteriological parameters;
    - interviews, administration of questionnaires and sampling of public opinions on social and cultural concerns relating to the Project sites and the area of influence; and
2. Legislative and regulatory considerations including national, international and WB requirements;
3. Identification of the potential direct, induced and cumulative impacts;
4. Analysis of feasible project alternatives;
5. Provision of mitigation and management measures for negative impacts identified;
6. Institutional capacities to address adverse impacts; and
7. Preparation of an ESMP including monitoring and institutional roles for the Tinga CMDC facility for review and acceptance by the PIU for securing an environmental permit for the intervention to commence.

1.6 Methodology and Approach to the Assignment

The activities carried out to accomplish this assignment are divided into four main categories as follows:

- Consultations;
- Desk work/Document Review;
- Field inspections/visits; and
- Reporting.

1.6.1 Stakeholder Consultations

The following institutions or organizations were consulted or contacted:

- Bole District Assembly;
- Tinga Community Mining Committee;
- Miners at Tinga;
- Youth Representatives at Tinga;
- Women In Mining at Tinga;
- Local Mining Investors in Tinga;
- Partners in Participatory Development, Non-Governmental Organization (NGO) operating in the Savannah Region/ Bole District; and
- Environmental Protection Agency (EPA)- Head Office, Accra.

Consultations with stakeholders identified some important environmental and social baseline conditions and issues as well as impacts that have been addressed in the ESMP. Details of stakeholder engagement are provided under Chapter 4 of this report.

Previous consultations with some of the relevant stakeholders was also utilized (**see Plate 1-3**).

Plate 1-3: Engagement with Some Executive of the Tinga Community Mining Committee

1.6.2 Document Review/Desk Study

Information from relevant documents from the PIU was of immense help to completing the ESMP assignment. Key documents reviewed for this study include the following among others:

1. Relevant World Bank ESS especially ESS 1;
2. The World Bank, AEHPMP (P167788) Project Information Document (PID) dated 16 December 2019;

3. Draft Environmental and Social Management Framework (ESMF), Africa Environmental Health and Pollution Management Program (P167788), undated;
4. Draft Stakeholder Engagement Plan (SEP), Republic of Ghana/ Environmental Protection Agency, Africa Environmental Health and Pollution Management Program (P167788), December 2019;
5. Draft Environmental and Social Commitment Plan (ESCP), Republic of Ghana/ Environmental Protection Agency, Africa Environmental Health and Pollution Management Program (P167788), December 2019;
6. Preliminary Design Reports of the Projects;
7. The Coordinated Programme of Economic and Social Development Policies (CPESDP) - Agenda for Jobs: Creating Prosperity and Equal Opportunity for All 2017-2024, October 2017;
8. 2021 Population and Housing Census, Results- Ghana Statistical Services, General Report Highlights in Different Volumes, February 2022;
9. Relevant National Policies;
10. Relevant Laws of Ghana including;
    a. The Constitution of the Republic of Ghana, 1992,
    b. Environmental Protection Agency (EPA) Act 1994, Act 490,
    c. Environmental Assessment Regulations (EAR) 1999, LI 652,
    d. Land Act 2020, Act 1036,
    e. Land Use and Spatial Planning Act 2016, Act 925,
    f. National Building Regulation 1996, LI 1630; and
    g. Mining Laws and Policies of Ghana.

Other relevant documents reviewed for this study include:

- ESMP documents on other projects obtained from the WB.

1.6.3 Field Inspections/ Visits

Field inspections were undertaken to the Tinga site and its immediate environs to confirm the project AoI, appreciate existing socio-economic and cultural conditions as well as existing terrestrial, conditions. The field visits were undertaken in April and July 2024.

1.6.4 Reporting

The ESMP report organization and contents satisfies both the WB ESSs and the EPA environmental assessment requirements. The major headings of the ESMP comprise:

- Introduction;
- Policy, Legal and Institutional Framework;
- Baseline Environmental and Social Conditions;
- Stakeholder Consultations, Disclosure and Grievance Management;
- Assessment of Potential Environmental and Social Risks and Impacts, and Alternative Analysis;
- Environmental and Social Management Plan and Recommended Mitigation Measures for Adverse Impacts;
- Environmental and Social Action Plans and Monitoring Programs;
- Institutional Capacity Requirement for ESMP Implementation;
- Decommissioning Plan;
- Conclusion;
- Bibliography; and
- Annexes.

2.0 RELEVANT POLICIES, LEGAL AND INSTITUTIONAL FRAMEWORK

The relevant World Bank Environmental and Social Standards (ESSs) and the national legal, policy and administrative frameworks applicable to the preparation and implementation of the site specific ESMP at Tinga are described below to guide implementation of project.

2.1 Relevant World Bank Environmental and Social Standards

The World Bank published a revised version of the safeguard policies in its Environmental and Social Framework (ESF) document (August 2016) in 2018. The ESF sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards (ESS) that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity. The ESF comprises:

1. A Vision for Sustainable Development, which sets out the Bank's aspirations regarding environmental and social sustainability;
2. The World Bank Environmental and Social Policy for Investment Project Financing, which sets out the mandatory requirements that apply to the Bank; and
3. The Environmental and Social Standards, together with their Annexes, which set out the mandatory requirements that apply to the Borrower and projects.

There are ten (10) Environmental and Social Standards (ESS) that establishes the standards that the Borrower and the project will meet through the project life-cycle and they are summarized in **Table 2-1**.

Table 2-1: Summary of WB Environmental and Social Standards

Standard	Summary of Core Requirements	Key Requirements of the ESS	Relevance to the Project
ESS 1	Assessment and Management of Environmental and Social Risks and Impacts	ESS 1 places the responsibility of ameliorating the environmental impacts of a Bank-financed project on the borrower. Specifically, the objectives of ESS1 are to: ❍ Identify, evaluate, and manage the environment and social risks and impacts of a Bank financed project in a manner consistent with the Bank's Environmental and Social Standards. ❍ To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the project. ❍ To utilize national environmental and social institutions, systems, laws, regulations and procedures in the assessment, development, and implementation of projects, whenever appropriate. ❍ To promote improved environmental and social performance, in ways which recognize and enhance Borrower capacity.	ESS 1 is relevant because the Project activities in Tinga are expected to cause some environmental and social risks and impacts, which will be mitigated accordingly. Thus, ESS 1 is the basis for the preparation of this ESMP.
ESS 2	Labor and Working Condition	Employment creation, income generation and welfare of labor are the core of ESS 2. It recognizes the importance of these in the pursuit of poverty reduction and economic	Activities under the proposed Project at Tinga will make use of direct workers and contracted workers, thus making ESS 2 relevant to the Project.

Standard	Summary of Core Requirements	Key Requirements of the ESS	Relevance to the Project
		growth. It requires management to treat workers fairly and provide them with safe and healthy working conditions to enhance the development benefits of projects.	
ESS 3	Resource Efficiency and Pollution Prevention and Management	ESS 3 sets out the requirements to address resource efficiency and pollution prevention (air, water and land pollution and management arising out of economic activities and urbanization) throughout the project life-cycle consistent with Good International Industry Practice (GIIP).	The Project at Tinga will result in multiple, small and diverse sources of emissions, as well as the generation of waste, thus, making ESS 3 relevant to the Project.
ESS 4	Community Health and Safety	ESS4 addresses the potential health, safety, and security risks and impacts of Bank financed projects (resulting from project activities, equipment, and infrastructure) on project-affected communities. It places a responsibility on the Borrower to avoid or minimize such risks and impacts, with particular attention to people who, because of their circumstances, may be vulnerable.	ESS 4 is relevant because of the potential community health and safety issues to be generated by the Project at Tinga e.g., the potential risk of increased Gender-Based violence (GBV) and Sexual Exploitation and Abuse (SEA)/ Sexual Harassment (SH) due to use of labor outside Tinga
ESS 5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	ESS 5 recognizes that Bank funded projects may result in involuntary resettlement, which, if unmitigated will lead to severe consequent undesirable socio-economic and environmental impacts on project communities.	This is not relevant as land for the Project at Tinga has been donated by the community
ESS 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	ESS 6 recognizes that Bank funded projects could negatively impact on biodiversity and that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development.	ESS 6 is not relevant because the Project will not cause loss of biodiversity. Results of the ecological survey done indicate that the subproject area is a modified habitat, and that small scale mining has led to a decline in the quality of vegetation and loss of flora and fauna.
ESS 7	Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	This ESS applies to a distinct social and cultural group referred to variously as 'Indigenous Peoples', "Sub-Saharan African historically underserved traditional local communities," "indigenous ethnic minorities," "aboriginals," "hill tribes," "vulnerable and marginalized groups," "minority nationalities," "scheduled tribes," "first nations," or "tribal groups ."	This is not relevant as no indigenous peoples will be impact. No such indigenous peoples are in Ghana
ESS 8	Cultural Heritage	ESS 8 recognizes the importance of cultural heritage (natural areas with cultural and/or spiritual value such as sacred groves, sacred bodies of water and waterways, sacred mountains, sacred trees, sacred rocks, burial grounds, and sites) as a source of valuable scientific and historical information, as an economic and social asset for development, and as an integral part of people's cultural identity and practice. It provides continuity in tangible and intangible forms between the past, present and future and reflects constantly	Although no tangible cultural heritage could be found at the Project site at Tinga, ESS 8 is relevant because the use of labor outside Tinga may infringe on some unique cultures of the community and the civil works may expose some cultural artefact or relic that may call for the attention of the relevant authorities

Standard	Summary of Core Requirements	Key Requirements of the ESS	Relevance to the Project
		evolving values, beliefs, knowledge, and traditions.	
ESS 9	Financial Intermediaries	This ESS applies to Financial Intermediaries (FIs) that receive financial support from the Bank. FIs include public and private financial services providers, including national and regional development banks, which channel financial resources to a range of economic activities across industry sectors.	This is not relevant as no financial intermediaries will be used for the Project at Tinga
ESS 10	Stakeholder Engagement and Information Disclosure	This ESS places premium on open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice.	ESS 10 is relevant to the Project at Tinga because it involves diverse stakeholders at every stage (design, planning, construction and operations). In line with this, a standalone Stakeholder Engagement Plan (SEP) has been prepared for the Project.

2.2 National Environmental and Social Policy Framework

The national policies identified as relevant or applicable to the Tinga CMDC are presented in this section in **Table 2-2**:

Table 2-2: Relevant National Policies and Applicability to the Proposed Project at Tinga

No.	Policy and Key Requirements	Applicability/ Relevance to Proposed Project
1	**The Coordinated Program of Economic and Social Development Policies (CPESDP) 2017-2024- Agenda for Jobs: Creating Prosperity and Equal Opportunity for All** The Agenda for Jobs is the medium-term national development policy framework of Economic and Social Development Policies (CPESDP), 2017-2024 – An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All. It serves as the implementation framework to guide the overall economic and social development of the country. This vision is informed by the need for a strong economy that expands opportunities, inspires people to start businesses, stimulates expansion of existing businesses that ultimately leads to creation of jobs, increased economic growth and higher incomes. The vision also takes cognizance of Ghana's international commitments such as the African Union (AU) Agenda 2063 and the United Nations Sustainable Development Goals (SDGs).	The proposed Project at Tinga involves the elimination of mercury in gold mining and promotes enhanced gold production, and associated employment generation and thus in line with the policy objectives
2	**National Environmental Policy (NEP), 2014** The ultimate aim of the National Environmental Policy of Ghana is to improve the surroundings, living conditions and the quality of life of the entire citizenry, both present and future. It seeks to promote sustainable development by ensuring a balance between economic development and natural resource conservation.	The proposed Project at Tinga seeks to promote sustainable development by including biophysical environment, economic, social and institutional considerations in its formulation.
3	**National Environmental Action Plan (NEAP), 1991** The NEAP defined a set of policy actions, related investments, institutional mandates and strengthening activities to make Ghana's development approaches environmentally sustainable. The adoption of the NEAP in 1991 led to several significant developments necessary to ensure sound resource management in the following major areas: Land management; Forestry and wildlife; Water management; Marine and coastal ecosystems; Industrial pollution; Mining; Hazardous chemicals control; and Human settlements. The NEAP was thus the strategy through which the key issues to the protection of the environment and better management of renewable resources were to be pursued. Some of the specific resultant developments from the NEAP was the establishment of the Ghana Environmental Protection Agency (EPA) with more enhanced mandate than its predecessor Environmental Protection Council (EPC), to regulate, set standards and enforce them, etc; and, the establishment of the Water Resources Commission, and subsequent adoption of policy framework for water abstraction for different uses, water law, and control of waste discharges into water bodies, etc.	The proposed Project at Tinga seeks to promote sustainable development and eliminate mercury use in small scale mining.
4	**National Land Policy (NLP), 1999**	

No.	Policy and Key Requirements	Applicability/ Relevance to Proposed Project
	The Land Policy of Ghana aims at the judicious use of the nation's land and all its natural resources by all sections of the Ghanaian society in support of various socio-economic activities undertaken in accordance with sustainable resource management principles and in maintaining viable ecosystems. One key objective is to ensure that every socio-economic activity is consistent with sound land use through sustainable land use planning in the long-term national interest.	The construction and operation of the proposed CMDC at Tinga will be on a land donated by the community through the Tinga community mining scheme
5	**National Water Policy (NWP), 2007** The National Water Policy of Ghana provides a framework for the sustainable development of Ghana's water resources. The policy also recognises the various cross-sectoral issues related to water-use and the links to other relevant sectoral policies such as those on sanitation, agriculture, transport and energy among others. It recognizes the competing and conflicting demands of water between mining and adjacent communities. Some of the key policy objectives include ensuring: (i) availability of water for hydropower generation, various industrial/ commercial uses, mining operations, water transport and recreational purposes; and (ii) ensure adequate protection of water sources in mining and other industrial areas.	The Environmental and Social Management Plan (ESMP) includes mitigation measures against traversing water bodies and against water pollution as well as complying with the riparian buffer zones policy.
6	**Riparian Buffer Zone Policy (RBZP), 2014** The Buffer Zone Policy is aimed at protecting, regenerating and maintaining the native /established vegetation in riparian buffer zones to improve water quality. The Policy also designates the following as water pollution hazards and must be setback from any stream or water body by the following distances: o Storage of hazardous substances – 45m; o Raised septic systems – 75m; and o Solid waste landfills- 90m.	The ESMP includes mitigation measures to protect buffer zones of water bodies (streams/ rivers) against setting up processing plants in the buffer zone. The setback distances provided to minimize water pollution will be applied especially for storage of hazardous substances.
7	**Forest and Wildlife Policy, 2012** The policy aims at the conservation and sustainable development of forest and wildlife resources for the maintenance of environmental stability and continuous flow of optimum benefits from the socio-cultural and economic goods and services that the forest environment provides to the present and future generations, whilst fulfilling Ghana's commitments under international agreements and conventions.	The proposed location although not in designated forest zones are in areas where there is substantial vegetative cover in the surroundings hence the need to avoid deforestation and hunting for wildlife.
8	**Ghana National Climate Change Policy (GNCCP), 2013** The objective of the policy is to mitigate and ensure an effective adaptation in key sectors of the economy, such as natural resources management, energy, industry and infrastructure among others. The main principles adduced in the policy for disaster preparedness and response regarding building of climate resilient infrastructure are: o The development of infrastructure and associated facilities has a direct influence on the sustainable development of the nation; and o Incorporating climate-resilient codes into basic infrastructure will significantly reduce the vulnerability of the nation to climate change risks.	The clean mine demonstration center at Tinga will be climate resilient and help prevent further impact on climate change in the country.
9	**National Health Policy (NHP), 2020** The National Health Policy (NHP) document which aims at creating wealth through health, among other things places emphasis on improvements in personal hygiene, the practice of safe sex and the prevention of injuries at both workplaces and on the road. The policy objectives include among others to: (i) encourage the adoption of healthy lifestyles; (ii) improve the physical environment; (iii) improve the socio-economic status of the population.	The project will contribute to the elimination of mercury use in mining in the long term and also ensure community health and safety and occupational health and safety compliant measures at the clean mine demonstration centers including safety awareness creation and HIV/ AIDS prevention
10	**National Workplace HIV/AIDS Policy, 2012** The policy goal is to provide broad national guidelines to direct the formulation and implementation of workplace HIV and AIDS policies and programs. The broad objectives of the policy are to: o provide protection from all forms of stigma and discrimination in the workplace, to people with real or perceived HIV infection. o prevent the spread of HIV amongst workers and their families and dependents; and o provide access to treatment, care and support for persons infected and affected by HIV and AIDS.	The project will ensure provision of occupational health and safety measures at the workplaces that will include HIV/ AIDS awareness creation and prevention
11	**National Employment Policy (NEmP), 2014** The National Employment Policy indicates that poverty is still high at about 28.5% and that there is a strong correlation between the employment situation and poverty.	The project will provide employment and skills

No.	Policy and Key Requirements	Applicability/ Relevance to Proposed Project
	The policy states that the key source of demand for labor emanates from the productive sectors of the economy, namely, agriculture, industry and service.	development opportunities for Ghanaians during the pre-construction, construction and operational phases.
12	**National Gender Policy, 2015** The National Gender Policy aims at mainstreaming gender equality concerns into the national development processes by improving the social, legal, civic, political, economic and socio-cultural conditions of the people of Ghana. It also seeks to empower the vulnerable groups particularly women, children, and people with special needs such as persons with disabilities and the marginalized.	The management of the Tinga clean mine demonstration center will ensure that an employment quota is given to women and the vulnerable. The criteria for selecting workers will include gender and disability in as far as the person can perform the task assigned.

2.3 Relevant Legal and Regulatory Framework

In Ghana, all minerals in their natural state in or upon any land or water are the property of the Republic of Ghana and vested in the President on behalf of the people of Ghana as enshrined in The 1992 Constitution of the Republic of Ghana, Article 257(6) of Act 527 of 1996. The Minerals Commission was established under the Minerals Commission Act, 1993, (Act 450) which mandates the commission as responsible for the regulation and management of the utilization of the mineral resources of Ghana and the co-ordination of the policies in relation to them. The Act also mandates the Minerals Commission to grant applicable licenses/ lease to registered and qualified mining firms and to ensure compliance with laid down Mineral and Mining Laws and Regulations of Ghana.

In order to manage properly all the issues involved in mining, the Government of Ghana (GoG) has promulgated the following regulations to give meaning to the Minerals and Mining Act, 2006 (Act 703) as amended by the Minerals and Mining (Amendment) Act, 2015 (Act 900) and the Minerals and Mining (Amendment) Act, 2019 (Act 995):

- Minerals and Mining (General) Regulations, 2012 (LI 2173);
- Minerals and Mining (Support Services) Regulations, 2012 (LI 2174);
- Minerals and Mining (Compensation and Settlement) Regulations, 2012 (LI 2175);
- Minerals and Mining (Licensing) Regulations, 2012 (LI 2176);
- Minerals and Mining (Explosives) Regulations, 2012 (LI 2177);
- Minerals and Mining (Health, Safety and Technical) Regulations, 2012 (LI 2182);
- Minerals and Mining (Ground Rent) Regulations, 2018 (LI 2357);
- Minerals and Mining (Mineral Operations- Tracking of Earth Moving and Mining Equipment) Regulations, 2020 (LI 2404); and
- Minerals and Mining (Local Content and Local Participation) Regulations, 2020 (LI 2431);

Thus, the relevant regulatory obligations to guide the project from its conceptualisation to its implementation and monitoring as well as decommissioning include the following and as explained in **Table 2-3**:

Table 2-3: Relevant Legal Framework and Applicability to the Proposed Project at Tinga

No.	Legal Framework and Key Compliance Requirements	Applicability to Proposed Project
	Environmental Protection, Planning and Permitting	
1	**The Constitution of the Republic of Ghana, 1992** The Constitution provides for in Article Article 41(k) as a duty of a citizen of Ghana "to protect and safeguard the environment".	This project has been designed to contribute to the protection and safeguarding of Ghana's environment for present and future generations.
2	**Environmental Protection Agency (EPA) Act, 1994 (Act 490)** The Environmental Protection Agency (EPA) Act 1994 (Act 490) gives mandate to the Agency to ensure compliance of all investments and undertakings with laid down Environmental Assessment (EA) procedures in the planning and	The Agency is ensuring compliance with laid down Environmental Assessment

No.	Legal Framework and Key Compliance Requirements	Applicability to Proposed Project
	execution of development projects, including compliance in respect of existing ones. The Environmental Protection Agency (EPA) Act 490 Section 12 of 1994 confers enforcement and control powers on the EPA to compel existing companies to meet environmental or pollution management plans on their operations as a management tool for effective pollution control. The EPA is the responsible for issuing environmental permits for operations such as this project subject to EPA review.	(EA) procedures in the planning and execution of the project. An environmental permit from the EPA is required prior to commencement of works and would be obtained using this ESMP document.
3	**Environmental Assessment Regulations, 1999 (LI 1652)** The Environmental Assessment Regulations 1999 (LI 1652) enjoins any proponent or person to register an undertaking with the Agency and obtain an Environmental Permit prior to commencement of the project. This regulation allows the EPA to place proposed undertakings at the appropriate level of environmental assessment. The LI 1652 seeks to ensure that development is undertaken in a sustainable environment. Part 1 of the Environmental Assessment Regulations, 1999 LI 1652 on Environmental Permit describes undertakings requiring registration and issuance of environmental permit, as: '1. (1) No person shall commence any of the undertakings specified in Schedule 1 to these Regulations or any undertaking to which a matter in the Schedule relates, unless prior to the commencement, the undertaking has been registered by the Agency and an environmental permit has been issued by the Agency in respect of the undertaking. 2. No person shall commence activities in respect of any undertaking which in the opinion of the Agency has or is likely to have adverse effect on the environment or public health unless, prior to the commencement, the undertaking has been registered by the Agency in respect of the undertaking.'	An ESMP (or a Preliminary Environmental Report in the case of country requirements) is being prepared in compliance with the requirements of the World Bank, and Ghana's Environmental Assessment Regulations, 1999 (LI 1652). The project activities will not occur in an environmental sensitive area (as no environmental sensitive areas have been identified in the project area, which is a mining concession)
4	**Fees and Charges (Miscellaneous Provision) Act, 2022(Act 1080)** The Fees and Charges (Miscellaneous Provision) Act 2022 replaces the Fees and Charges (Amendment) Instrument 2019 (L.I. 2386) and it provides comprehensive rates, fees and charges collectable by Ministries, Department and Agencies (MDAs) for goods and services delivered to the public.	All stipulated fees and charges including Processing and Permit Fees shall be paid by the PIU in order to obtain the environmental permit from EPA
5	**Water Resources Commission (WRC) Act, 1996 (Act 522)** The Water Resources Commission Act, 1996 (Act 522) establishes and mandates the Water Resources Commission (WRC) as the sole agency responsible for the regulation and management of the utilisation of water resources and for the co-ordination of any policy in relation to them. Section 13 prohibits the use of water (divert, dam, store, abstract or use water resources or construct or maintain any works for the use of water resources) without authority. Section 16 empowers the Commission to grant Water Rights (water use permits) to prospective users. The Act states under Section 24 that any person who pollutes or fouls a water resource beyond the level that the EPA may prescribe, commits an offence and is liable on conviction to a fine or a term of imprisonment or both.	The project will involve the use of water for the mercury free gold processing plants. The appropriate authorization will be sought from the WRC prior to the commencement of the work(s).
6	**Water Use Regulations, 2001 (LI 1692)** The Water Use Regulations 2001, LI 1692 prohibits the use of water resources without authority from the Water Resources Commission. The Act provides under section 16 for any person to apply to the Commission in writing for the grant of water right. The Regulations also prescribe the raw water charges and processing fees to be paid by prospective water users with respect to the water use permits. The Commission is also mandated to request for evidence that an EIA or an EMP has been approved by the EPA before issuance of the Water Use Permit.	The PIU will be required to acquire a water use permit after obtaining the environmental permit. The abstraction of water for any aspect of the Project at Tinga will also require a water use permit from the Commission.
7	**Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917)** The Act prohibits the importation, exportation, transportation, selling, purchasing or dealing in hazardous wastes or other waste, or depositing of hazardous wastes or other wastes on any land in the country or in the territorial waters of Ghana except as otherwise provided for in the Act.	All hazardous and electronic waste arising out of the proposed project implementation will be managed in compliance with this law. Waste oils, e-waste chemical additives/ admixtures for construction and any

No.	Legal Framework and Key Compliance Requirements	Applicability to Proposed Project
		expired chemicals requiring disposal will fall under this law
	Health/Safety	
8	**Public Health Act, 2012 (Act 851)** The Act makes provision with respect to the protection of public health in Ghana to prevent diseases, promote, safeguard, maintain, and protect the health of humans and animals in the country and lays down rules relative to environmental sanitation (Part 5). The Act among other things, provides rules relative to food vending and food-borne diseases. Part 7 of the Act mandates the Food and Drugs Authority (FDA) to protect the public through the regulation of food, drugs, household chemical substances, cosmetics and medical devices.	The project activities will be guided by this Act in (i) ensuring the prevention of communicable diseases to workers and (ii) that the project activities do not adversely affect the health of communities hosting the clean mine demonstration center.
9	**Ghana National Fire Service Act, 1997 (Act 537)** The Act re-establishes the National Fire Service to provide for the management of undesired fires and to make provision for related matters. The objective of the Service is to prevent and manage undesired fire. For the purpose of achieving its objective, the Service is to organise public fire education programs to create and sustain awareness of the hazards of fire, heighten the role of the individual in the prevention of fire and provide technical advice for building plans in respect of machinery and structural layouts to facilitate escape from fire, rescue operations and fire management. The GNFS has a rural fire department responsible for the control and management of bushfires.	This act requires the PIU and miners to register their facilities/work offices with GNFS who will provide advisory and emergency response services in the detection/prevention and management of fire outbreaks at the project sites and facilities. The GNFS is mandated to create awareness and conduct sensitization programs on fire prevention and control as well as issue fire permits for proposed project sites and facilities.
	Minerals and Mining	
10	**Minerals Commission Act, 1993 (Act 450)** The act establishes the Minerals Commission and provides for its composition and functions relating to the regulation and management of the utilisation of minerals. The act also provides for other related matters.	The Act requires the miners to comply with the requirements of the Minerals Commission
11	**The Minerals and Mining Act, 2006 (Act 703)** The Act revises and consolidates the law relating to minerals and mining and provides for connected purposes. It states that every mineral is "vested in the President in trust for the people of Ghana". Section 73 of Act 703 provides for compensation for disturbance of owner's rights which includes resettlement. It indicates that the owner or lawful occupier of any land subject to mineral right is entitled to compensation for disturbance of his/her rights and the amount of compensation should be determined by agreement between the parties, the Lands Valuation Division will determine the compensation payable. Section 74 of the act provides for the compensation principles to be applied. Where resettlement is triggered, it shall be carried out with due regard to the economic well-being and social and cultural value of the affected people and the cost of resettlement borne by the holder of mineral right. The subsidiary legislations for the management of the minerals and mining industry to operationalize the Minerals and Mining Act, 2006 (Act 703) as indicated supra include the following: o Minerals and Mining (General) Regulations, 2012 (LI 2173); o Minerals and Mining (Support Services) Regulations, 2012 (LI 2174); o Minerals and Mining (Compensation and Settlement) Regulations, 2012 (LI 2175); o Minerals and Mining (Licensing) Regulations, 2012 (LI 2176); o Minerals and Mining (Explosives) Regulations, 2012 (LI 2177); o Minerals and Mining (Health, Safety and Technical) Regulations, 2012 (LI 2182); o Minerals and Mining (Ground Rent) Regulations, 2018 (LI 2357);	The Act requires the miners to comply with a number of legislations providing for the health, safety and other issues pertaining to the operation of the mine

No.	Legal Framework and Key Compliance Requirements	Applicability to Proposed Project
	○ Minerals and Mining (Mineral Operations- Tracking of Earth Moving and Mining Equipment) Regulations, 2020 (LI 2404); and ○ Minerals and Mining (Local Content and Local Participation) Regulations, 2020 (LI 2431); Excerpts of aspects of the listed regulations are as presented hereunder: Among the many regulations of LI 2173 is the requirement to ensure good record keeping and reporting obligations (Regulation 8). LI 2174 regulates the registration of entities to provide support services to a holder of a mineral right and what is required of them. LI 2175 regulates the requirements for compensation payment and resettlement. It specifies the formulation of resettlement plan and engagement of the affected persons among others. LI 2176 regulates the grant of various licenses in the mining sector including the grant of mining leases. LI 2177 regulates the conveyance, storage, possession, manufacture, and use of explosives for mining, quarrying, and civil works as well as substances used for manufacture of explosives. The regulation 8(1) of the Minerals and Mining (Health, Safety and Technical) Regulations 2012, LI 2182 stipulates that the holder of a mining lease must obtain a Mining Operating Permit from the Inspectorate Division of the Minerals Commission prior to commencement of operations by submitting to the Division a Mining Operating Plan (MOP), the content of which is as set out in Regulation 9. The regulation 11(1) of the Minerals and Mining (Health, Safety and Technical) Regulations 2012, LI 2182 stipulates that the owner or manager of a mine shall submit to the Inspectorate Division for Approval, an Emergency Response Plan (ERP) capable of being implemented at any time in response to an emergency that occurs in the mine. The LI 2357 specifies the ground rent payable annually by a mineral rights holder in respect of a cadastral unit of land. The purpose of LI 2404 is to (i) provide for the registration and tracking of earth moving and mining equipment used in mineral operations and (ii) ensure that the earth moving and mining equipment are used only in the specific mineral rights area that the earth moving and mining equipment is registered for. LI 2431 reinforces the need for local participation and local content in the mining value chain. The implication for the project will be to comply with above mentioned LIs presented supra.	
	Labour Rights	
12	**<u>The Labour Act, 2003 (Act 651)</u>** Section 118(1) of the Labour Act 2003 (Act 651) stipulates that it is the duty of an employer to ensure that every worker employed works under satisfactory, safe and healthy conditions. Act 651 contains several specific provisions relating to an employer's duty of care to its workers. These include providing and maintaining "at the workplace, plant and system of work that are safe and without risk to health" and taking "steps to prevent contamination of the workplaces by, and protect the workers from, toxic gases, noxious substances, vapours, dust, fumes, mists and other substances or materials likely to cause risk to safety or health". A worker is required to report situations that he believes may pose "an imminent and serious danger to his or her life, safety or health". The law prohibits persons below the age of eighteen from employment to operate any lifting machine driven by mechanical power or to give signals to its operator.	This Act requires the PIU and the miners to ensure the welfare of workers. The miners will be committed to ensure the safety and health of their workers by providing a safe working environment and providing the required apparatus and measures to mitigate impacts.
13	**<u>Workmen Compensation Law, 1987 (PNDCL 187)</u>** The law holds employers responsible for the payment of compensation to workmen for personal injuries caused by accidents arising out and in the course of their employment.	The Law enjoins the PIU to ensure and be responsible for the safety of its workers and provide compensation to its workers for injuries arising in the course of work in accordance with this Law
14	**<u>Persons with Disability Act, 2006 (Act 715)</u>** The Act covers key thematic provisions such as rights, accessibility, employment, education and transportation for Persons with Disabilities (PWDs) amongst others. Section 6 states that the owner or occupier of a place to which the public has access shall provide appropriate facilities that make the place accessible to and available for use by a person with disability. Section 10 of	The PIU and the miners will be guided by this Act in the design of the mercury free plants and the employment of labour for the proposed

No.	Legal Framework and Key Compliance Requirements	Applicability to Proposed Project
	the Act 10. (1) The Government shall grant a person who employs a person with disability an annual tax rebate of the taxable income in respect of each person with disability employed as shall be prescribed in Regulations made under this Act.	project and will ensure that there is no discrimination against PWDs
15	**The Children's Act, 1998 (Act 560)** The Act spells out the rights of the child, quasi-judicial/ judicial child adjudication, parentage/ custody/ access/ maintenance, fosterage/ adoption and employment of children issues. The Act defines a child as a person below the age of 18 years. The minimum age for admission of a child to employment is fifteen years and the minimum age for the engagement of a person in hazardous work is eighteen years. No person shall engage a child in exploitative labour; labour is exploitative of a child if it deprives the child of its health, education or development.	The PIU and the miners will be guided by this Act in the employment of labor for the proposed facility and will ensure all persons engaged are not below the minimum age.
	Land Acquisition/Land Use	
16	**Land Act, 2020 (Act 1036)** The Land Act, 2020 (Act 1036) repeals the State Lands Act, 1962 (Act 125), and other related laws. Section 2 of Chapter 3 of the Act 1036 states that "A holder of an interest or right in land may, by an instrument, transfer that interest or right to any person with or without consideration." Section 234(2) of the Act 1036 also states that "the State may accept land as gift from the owner of the land and the land shall, where the donor specifies a purpose for the gift, be used for the purpose determined by the owner."	The PIU will ensure that the Tinga CMDC has acquired all the necessary land documents and are valid.
17	**The Land Use and Spatial Planning Act, 2016 (Act 925)** The Act seeks to revise and consolidate the laws on land use and spatial planning, provide for sustainable development of land and human settlements through a decentralized planning system, ensure judicious use of land in order to improve quality of life, promote health and safety in respect of human settlements and to regulate national, regional, district and local spatial planning, and generally to provide for spatial aspects of socio-economic development and for related matters. This Act therefore repeals the following: (i) Town and Country Planning Act 1945 CAP 84; (ii) Part II of Act 462 on Planning Functions; (iii) Towns Act of 1892, CAP 86; and Towns and Country Planning (Amendment) Act 1960, Act 33.	The design of the proposed project facilities must conform with the planning regime of LUSPA
18	**National Building Regulations, 1996 (LI 1630)** The National Building Regulations, LI 1630 provides guidance and standard to any person who intends to erect any building; or make any structural alteration to any building; or executes any works or installs any fittings in connection with any building. As per clause 14.14 of the National Building Regulations, "…buildings of four floors and over shall be subject to such requirements as may be laid down by the District Planning Authority for each particular case". The process of obtaining a development permit makes it contingent on the issuance of an environmental permit by the EPA.	The implication of this Act is that a Development Permit would have to be obtained from the Bole District Assembly
	Local Governance and Alternative Dispute Resolutions	
19	**Local Governance Act, 2016 (Act 936)** The Local Governance Act 2016, which repeals the Local Government Act 1993 (Act 462) re-establishes and regulates the local government system and gives authority to the Regional Coordinating Council (RCC) and the District Assembly (DA) to exercise political and administrative power in the Regions and District, provide guidance, give direction to, and supervise all other administrative authorities in the regions and district respectively. The Assembly is mandated to initiate programs for the development of basic infrastructure and provide municipal works and services as well as be responsible for the development, improvement and management of human settlements and the environment in the district. The Local Governance Act 2016 also empowers the Assemblies to establish Waste Management Departments to be responsible for the development and management of waste disposal within their areas of jurisdiction. Therefore, the management of waste at the construction and operational stages of the proposed project will have to be done in conjunction with the relevant MMDAs	The Bole District Assembly will provide the needed supervisory roles in the implementation of the proposed Project at Tinga and the ESMP.

No.	Legal Framework and Key Compliance Requirements	Applicability to Proposed Project
20	**Alternative Dispute Resolution Act, 2010 (Act 798)** The purpose of the Act is to "…provide for the settlement of disputes by arbitration, mediation and customary arbitration, to establish an Alternative Dispute Resolution Center and to provide for related matters." The Act further defines Alternative Dispute Resolution "as the collective description of methods of resolving disputes otherwise than through the normal trial process" (Section 135). The ADR Act covers both domestic and international arbitration in Ghana and the enforcement of both domestic and foreign arbitral awards within the jurisdiction.	The PIU and the miners will ensure that the alternative dispute resolution option is used to address disputes and conflicts within the frame of the EPA GRM and other indigenous ways of resolving disputes instead of the more expensive and time-consuming legal court system.

2.3.1 Ghana Standards on Environmental Quality

The Ghana Standards Authority (GSA) has in collaboration with the EPA and through various National Technical Committees issued Ghana Standard (GS) requirements for Noise Control and Measurements, and Air Quality, and Requirements for Effluent Discharge (General Industry) as follows:

1. GS 1236:2019- Environment and Health Protection – Requirements for Ambient Air Quality and Point Source/ Stack Emissions;
2. GS 1222:2018- Health Protection – Requirements for Ambient Noise Control; and
3. GS 1212:2019- Environmental Protection Requirements for Effluent Discharge (General Industry).

2.3.1.1 GS 1236:2019

The GS 1236:2019 provides for permissible levels for a variety of air pollutants as shown in **Table 2-4**.

Table 2-4: National Ambient Air Quality – GS 1236:2019

NO.	SUBSTANCE	TIME WIGHTED AVERAGE, (TWA)	AVERAGING TIME
1.	Sulphur Dioxide (SO_2)	*520* µgm^{-3} *50* µgm^{-3}	*1hr* 24hrs
2.	Nitrogen Oxides (measured as NO_2)	*250* µgm^{-3} 150 µgm^{-3}	*1hr* 24hrs
3.	Total Suspended Particulate (TSP/SPM)	*150* µgm^{-3} 80 µgm^{-3}	*24hrs* 1yr
4.	PM_{10}	*70* µgm^{-3} *70* µgm^{-3}	*24hrs* 1yr
5.	$PM_{2.5}$	*35* µgm^{-3}	*24hrs*
6.	Carbon Monoxide (CO)*	*100 mg/m^3* 60 mg/m^3 30 mg/m^3 10 mg/m^3	*15mins* 30mins 1hr 8hrs

(Source: GSA, 2019) **……Fenceline Air Pollutant Standard*

2.3.1.2 GS 1222:2018

The GS 1222:2018 provides for permissible night and day noise levels as shown in **Table 2-5.**

Table 2-5: Ambient Noise Control Levels

ZONE	DESCRIPTION OF AREA OF NOISE RECEPTION	PERMISSIBLE NOISE LEVEL IN dB(A)	
		DAY 0600 - 2200	NIGHT 2200 - 0600
A	Residential areas	*55*	48
B	Educational and health facilities, office and law courts	*55*	50
C	Mixed Use	60	*55*
D	Areas with some light industry	65	60
E	Commercial areas	*75*	65
F	Light industrial areas	70	60
G	Predominantly heavy industrial areas	70	70
Ensure that maximum noise level near the construction site does not exceed 66dB(A) in other areas and *75*dB(A) in an industrial area			

(Source: GSA, 2018)

2.3.1.3 GS 1212:2019

The environmental protection- requirements for effluent discharge are as provided in **Table 2-6.**

Table 2-6: Environmental Protection - Requirements for Effluent Discharge for Gold Mining

Parameter	Unit	GS 1212:2019+
Color	TCU	200
Conductivity	µS/cm	1,500
Temperature	°C	≤ 3° above ambient
Turbidity	NTU	75
pH	pH Units	6 - 9
Total Dissolved Solids (TDS)	mg/l	1,000
Total Suspended Solids (TSS)	mg/l	50
COD	mg/l	250
Ammonia as Nitrogen	mg/l	1
Nitrate as Total Nitrogen	mg/l	50
Oil/ Grease	mg/l	5
Fluoride	mg/l	10
Cyanide (Total)	mg/l	1
Free Cyanide	mg/l	0.2
WAD Cyanide	mg/l	0.6
Silica	mg/l	20
Selenium	mg/l	1
Copper	mg/l	5
Arsenic (Total)	mg/l	1.0
Arsenic (Soluble)	mg/l	0.1
Chromium (Total)	mg/l	0.5
Lead	mg/l	0.1

(Source: GSA, 2019)

2.3.2 Project Standards

The proposed project will apply the stricter of either national laws or the World Bank Group (WBG) standards (EHS Guidelines). The Project standards for emissions and performance therefore are the stricter of:

- Ghana standards; and
- Applicable standards of the WBG EHS Guidelines.

2.4 World Bank Group Environment, Health and Safety (EHS) Guidelines

The World Bank Group (WBG) Environmental, Health, and Safety (EHS) Guidelines (General EHS Guidelines, April 30, 2007) are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document. The applicable EHS guidelines include:

1. General EHS Guidelines;
2. EHS Guidelines for Mining; and
3. EHS Guidelines for Base Metal Smelting and Refining.

2.4.1 General EHS Guidelines

The General EHS Guidelines (April 30, 2007) provides guidance to users on common EHS issues potentially applicable to all industry sectors. The general guidelines provide GIIP advice relating to the following elements to protect human health and the environment.

The WBG General EHS Guidelines are relevant to the proposed project as they provide internationally accepted GIIP for relevant EHS issues. The recommendations contained in the guidelines will be reviewed during the preparation of the ESMPs and will be incorporated into the prescribed management and mitigation measures as appropriate.

2.4.2 EHS Guidelines for Mining

The EHS Guidelines for Mining are applicable to underground and open-pit mining, alluvial mining, solution mining, and marine dredging. Potential environmental issues associated with mining activities may include management of the following:

- Water use and quality;
- Wastes;
- Hazardous materials;
- Land use and biodiversity;
- Air quality;
- Noise and vibrations;
- Energy Use; and
- Visual Impacts.

2.4.3 EHS Guidelines for Base Metal Smelting and Refining

The EHS Guidelines for Smelting & Refining cover information relevant to base metal smelting and refining of lead, zinc, copper, nickel, and aluminum. It does not include the mining and concentration of the raw materials, which is covered in the EHS Guidelines for Mining. Significant environment aspects of smelting and refining during the operational phase relate to:

- Air Emissions;
- Wastewater;
- Hazardous materials;
- Residues and waste; and
- Noise

2.5 Relevant International Conventions and Protocols

The following international laws and conventions which Ghana is a signatory are considered applicable to this proposed project:

- African Charter on Human and Peoples' Rights (adopted 1998, entered into force 2005);
- African Convention on the Conservation of Nature and Natural Resources (adopted 1968, entered into force 1969);
- International Covenant on Economic, Social and Cultural Rights (adopted 1966, entered into force 1976);
- International Labor Organization's (ILO) Core Labor Standards on Freedom of association and collective bargaining; conventions 87 (1950) and 98 (1951);
- Elimination of forced and compulsory labor; conventions 29 (1932) and 105 (1959)
- Elimination of discrimination in respect of employment and occupation; conventions 100 (1953) and 111 (1960)
- Abolition of child labor; conventions 138 (1976) and 182 (2000)
- United Nations Convention on the Protection of the Rights of All Migrant Workers and Members of their Families (adopted 1990, entered into force 2003)
- United Nations Framework Convention on Climate Change (adopted 1992, entered into force 1994)
- Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted 1997, entered into force 2005)
- United Nations Convention on Biological Diversity (adopted 1992, entered into force 1993)

Also applicable to this project is the International Cyanide Management Code.

2.5.1 SDGs and ASGM

The Sustainable Development Goals (SDGs) are global problems defined into 17 goals with 169 specific targets. These goals recognize that ending poverty must go hand-in-hand with strategies that build economic growth and address a range of social needs including education, health, social protection, and job opportunities while tackling climate change and environmental

protection. They serve as a guidebook to drive a country's specific focus areas, policies, regulations, financing, stimulus programs, and many other activities aimed to achieve sustainable development. The proposed AEHPMP project at Tinga will provide a CMDC for the development of a sustainable ASGM in the area. The infrastructure of the Tinga CMDC will ensure that current unsustainable mining methods including mercury use are eliminated ensuring a more economic, financial, social, environmental (including climate resilience), and institutional sustainability over the entire life cycle of the project. The project will impact all the SDG goals especially Goal 1- eliminating poverty of all forms, Goal 3- ensure a healthy working environment by preventing the spread of infectious diseases such as HIV/AIDS, COVID 19 and others as well as diseases due to mercury contamination, Goal 5- to give equal employment opportunity for both men and women, Goal 8- to ensure the employment of youth, consultants and local artisans such as plumbers, electricians and many others, Goal 13- to build a climate change resilient infrastructure, Goal 15- ensure environmental sustainability in the process of construction and goal 17- fostering partnerships between financiers and miners.

2.5.2 Paris Agreement

The Paris Agreement was adopted in 2015 as an international agreement to address climate change that required deeper emissions reduction commitments from all countries both developed and developing. It seeks to hold global warming to below 2.0°C above pre-industrial levels and pursue further to limit this to 1.5°C. The Paris Agreement calls for sustainable development by providing opportunities for the Parties to reduce their emissions through economy-wide and sectoral mitigation actions, in accordance with their state of development, their national circumstances, and in full compliance with the principles and provisions of the UN Framework Convention on Climate Change (UNFCCC) through their Nationally Determined Contributions (NDCs). In their NDCs, countries communicate actions they will take to reduce their Greenhouse Gas emissions in order to reach the goals of the Paris Agreement. Countries also communicate in the NDCs, actions they will take to build resilience to adapt to the impacts of rising temperatures. The lands and natural resources sector which encompasses minerals and mining is one of Ghana's focal areas for climate change mitigation of which the proposed AEHPMP will take cognizance of this agreement.

2.5.3 GHA-Nationally Determined Contributions (NDCs): 2020 – 2030

Ghana's NDCs sought to reduce emissions by 15% to 45% below business-as-usual scenario by 2030 and strengthen climate resilience in close alignment with its development priorities. In all, 20 mitigation and 11 adaptation actions were outlined to take place across seven priority economic sectors - energy, agriculture, industry, transport, waste, and forestry and other land uses. The 20 mitigation measures have strong development imperatives and aim to scale up renewable energy, promote clean cooking and lighting, double energy efficiency in households and industry, promote mass urban transportation, reducing emissions from deforestation and forest degradation (REDD+), and promote alternative solid waste management. The 11 adaptation measures aim to build resilience in vulnerable agriculture landscapes, enhance value addition in the utilization of forest resources, promote resilient infrastructure, promote early warning systems and disaster prevention; manage climate-induced health risk; promote integrated waste management, and address gender considerations. The proposed AEHPMP project at Tinga will take cognizance of this commitment.

2.5.4 Convention on Biological Diversity (1992)

The Convention of Biological Diversity (CBD) was signed by 150 government leaders at the 1992 Rio Earth Summit, dedicated to promoting sustainable development. Conceived as a practical tool for translating the principles of Agenda 21 into reality, the convention recognize that biological diversity is not only about plants, animals and microorganisms and their ecosystems but also about people and our need for food security, medicines, fresh air and water, shelter and a clean and health environment in which we live in. The objective of CBD is to ensure preserving and sustaining biological diversity.

2.5.5 The Fundamental Conventions on Occupational Safety and Health (OSH): ILO Convention No. 155 (1981) on OSH and 187 (2006) on Promotional Framework for OSH

These Conventions are fundamental rights for a safe and healthy working environment. They express a renewed collective commitment to the protection of life and health at work. The core principles of Conventions Nos. 155 and 187 are fully complementary, and together they constitute a blueprint for progressive and sustained improvements towards the provision of safe and healthy working environments. Conventions Nos. 155 and 187 serve as the basis for additional occupational safety and health measures provided in other specific OSH instruments e.g., Convention No. 148 i.e., Working Environment (Air Pollution, Noise and Vibration). Additionally, to progressively achieve a safe and healthy working environment, Members need to take into account the principles set out in the ILO instruments relevant to the promotional framework for OSH.

2.5.6 Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise, and Vibration, 1977 (ILO Convention No. 148)

The Convention encourages employers that in consultation with their workers, they should understand project hazards related to air pollution, noise pollution, and vibrations. Under the Convention No 148, national laws or regulations shall prescribe those measures be taken for the prevention and control of, and protection against, occupational hazards in the working environment due to air pollution, noise and vibration.; and provisions concerning the practical implementation of the measures so prescribed may be adopted through technical standards, codes of practice and other appropriate methods.

2.5.7 The United Nations Convention of the Child

The United Nations Convention of the Child is an important agreement by countries who have promised to protect children's rights. It defines a child as any person under the age of 18 years. The Convention explains who children are, all their rights, and the responsibilities of governments. All the rights are connected, they are all equally important and they cannot be taken away from children. All children have all these rights, no matter who they are, where they live, what language they speak, what their religion is, what they think, what they look like, if they are a boy or girl, if they have a disability, if they are rich or poor, and no matter who their parents or families are or what their parents or families believe or do. No child should be treated unfairly for any reason.

2.5.8 International Cyanide Management Code

The International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold (Cyanide Code) is a voluntary, performance driven, certification program of best practices for gold and silver mining companies and the companies producing and transporting cyanide used in gold and silver mining. It provides a mechanism of assurance for enhancing the protection of human health and reducing the potential for environmental impacts. The objective of the Cyanide Code is to improve the management of cyanide used in gold and silver mining and to improve the protection of human health and the reduction of environmental impacts, while assuring stakeholders of the safe handling of cyanide through the disclosure of results from periodic audits by independent professional auditors.

Based on Principles and Standards of Practice, the Cyanide Code provides a management system for the safe management of cyanide throughout its use cycle.

2.5.9 Gap Analysis – Comparison of Ghana's Regulations/ Policies and World Bank ESF for Handling Environmental and Social Risks

From the above discussions, it is clear that significant gaps exist between Ghanaian national regulations and the applicable World Bank ESSs. These are summarized in **Table 2-7**. These gap bridging measures are to ensure compliance with the ESSs.

Table 2-7: Comparison of Ghana's Regulations/ Policies and World Bank ESF for Handling Environmental and Social Risks

Scope/Objective	Description of Bank Policy	Description of Government of Ghana Regulation	Gaps Identified	Gap Bridging Actions
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts				
○ Identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs. ○ To adopt a mitigation hierarchy approach to: - Anticipate and avoid risks and impacts - Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels; - Once risks and impacts have been minimized or reduced, mitigate; and - Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.	The standard provides guidance on assessing the Project's potential environmental and social risks and impacts and addressing potential impacts through planning and mitigation hierarchy approach.	Environmental Assessment. Regulation 1 (2) of LI 1652 mandates that no person shall commence an undertaking which in the opinion of the Agency has or is likely to have adverse effects on the environment or public health unless, prior to the commencement, the undertaking has been registered by the EPA and an environmental permit has been issued by the Agency in respect of the undertaking.	Even though the regulation seeks to anticipate and mitigate/avoid risks and impacts, it does not fully address potential impacts and mitigation hierarchy approach e.g., content wise it does not address impacts on the vulnerable.	○ The capacities of the PIU staff on world bank ESF will also be built at the early stage of project implementation to enable them collaborate effectively in addressing this gap
ESS2: Labor and Working Conditions				
○ To promote safety and health at work, fair treatment, non-discrimination and equal opportunity of project workers including vulnerable workers such as women, persons with disabilities, children etc. ○ To prevent the use of all forms of forced labor and child labor. ○ To support the principles of freedom of association and collective bargaining of project	ESS2 promotes the fair treatment, non-discrimination and provision of equal opportunities for workers engaged on projects it supports. It strongly encourages protection of all project workers, including vulnerable groups such as women, persons with disabilities, children (of working age) and migrant workers, contracted workers and primary supply workers, as appropriate. It provides certain requirements that the project must meet in terms of	○ The Labor Act 2003 (Act 651) provides for the rights and duties of employers and workers; legal or illegal strike; guarantees trade unions the freedom of associations and establishes Labor Commission to mediate and act in respect of all labor issues. Under Part XV (Occupational Health Safety and Environment), the Act explicitly indicates that it is the duty of an employer to ensure	Although the Labor Commission makes provision for anticipated labor-related complaints and redress, beneficiaries' access (distance and processes) to the commission at the district-level may be a challenge.	○ The project will use the Project Grievance Redress Mechanism (GRM) which addresses concerns promptly

Scope/Objective	Description of Bank Policy	Description of Government of Ghana Regulation	Gaps Identified	Gap Bridging Actions
workers in a manner consistent with national law. ○ To provide project workers with accessible means to raise workplace concerns.	working conditions, protection of the work force (especially the prevention of all forms of forced and child labor), and provision of a grievance mechanism that addresses concerns on the project promptly and uses a transparent process that provides timely feedback to those concerned.	the worker works under satisfactory, safe and healthy conditions. ○ The Workmen's Compensation Act 1987 (PNDCL 187) seeks to address the necessary compensations needed to be awarded to workers for personal injuries arising out of and in the course of their employment.		
OHS Hazard identification and right of employees to remove themselves from such workplaces without being punished.	Under ESS 2, workplace processes will be put in place for project workers to report work situations that they believe are not safe or healthy, and to remove themselves from a work situation which they have reasonable justification to believe presents an imminent and serious danger to their life or health. Project workers who remove themselves from such situations will not be required to return to work until necessary remedial action to correct the situation has been taken. Project workers will not be retaliated against or otherwise subject to reprisal or negative action for such reporting or removal.	Regulation 85 and 550 of LI 2182 details some obligations of workmen pertaining to their safety	The law requires an employee to assist others in removing them form an unsafe situation and to assist the manager in performing some relevant duties, but such duties have not been explicitly stated.	
ESS3: Resource Efficiency and Pollution Prevention and Management				
To achieve the sustainable use of resources, including implementing measures that avoids or reduces pollution resulting from project/ activities	The ESS 3 provides requirements for projects to achieve the sustainable use of resources, including energy, water and raw materials, as well as implement measures that avoids or reduces pollution resulting from project activities. The standard places specific consideration on hazardous wastes or materials and air emissions (climate pollutants) given that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens	The Act 490 mandates the EPA to enforce compliance with established EIA procedures among companies and businesses in the planning and execution of development projects, including existing ones.	To achieve the sustainable use of resources, including implementing measures that avoids or reduces pollution resulting from project activities	The ESS3 provides requirements for projects to achieve the sustainable use of resources, including energy, water and raw materials, as well as implement measures that avoids or reduces pollution resulting from project activities. The standard places specific consideration on hazardous wastes or materials and air emissions to be complied with.

Scope/Objective	Description of Bank Policy	Description of Government of Ghana Regulation	Gaps Identified	Gap Bridging Actions
	the welfare of present and future generations.			
ESS4: Community Health and Safety				
○ To anticipate and avoid adverse impacts on the health and safety of project affected communities during the project lifecycle from both routine and non-routine circumstances. ○ To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure. ○ To ensure that safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	This standard recognizes that project activities, equipment and infrastructure increase the exposure of project stakeholder communities to various health, safety and security risks and impacts and thus recommends that projects implement measures that avoids or limits the occurrence of such risks. It provides further requirements or guidelines on managing safety, including the need for projects to undertake safety assessment for each phase of the project, monitor incidents and accidents and preparing regular reports on such monitoring. ESS4 also provides guidance on emergency preparedness and response.	Public Health Act, 2012, Act 851 revises and consolidates all the laws and regulations pertaining to the prevention of disease, promote, safeguard and maintain and protect the health of human and animals, and to provide for related matters. The law has merged all provisions in the criminal code, ordinances, legislative and executive instruments, acts, by-laws of the District Assemblies etc. The Act enjoins the provision of sanitary stations and facilities, destruction of vectors including mosquitoes, protection of water receptacles and the promotion of environmental sanitation. The LI 2182 however, provides for the provision of an Emergency Response Plan (ERP) as part of the mines Mining Operation Plan (MOP).	The Act does not consider assessment of events and measures to deal with occurrences and emergencies. This is however achieved in the Emergency Response Plan (ERP) required under LI 2182.	An Emergency Response Plan has been provided as part of the ESMP
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources				
○ To protect and conserve biodiversity and habitats. ○ To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity. ○ To promote the sustainable management of living natural resources. ○ To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of	ESS 6 promotes the conservation of biodiversity or natural habitats and supports the protection and maintenance of the core ecological functions of natural habitats and the biodiversity they support. It also encourages projects to incorporate into their development, environmental and social strategies that address any major natural habitat issues, including identification of important natural habitat sites, the ecological functions they perform, the degree of threat	The 1994 Forest and Wildlife Policy was revised in 2011 and subsequently approved in 2012 aims at the conservation and sustainable development of forest and wildlife resources for the maintenance of environmental stability and continuous flow of optimum benefits from the socio-cultural and economic goods and services that the forest environment provides to the present and future generations, whilst fulfilling Ghana's commitments under international agreements and conventions.	Adequate provisions have been made under a number of national laws and policies.	The project will take measures to protect and conserve biodiversity and habitats and all requirements specified in the ESS 6

Scope/Objective	Description of Bank Policy	Description of Government of Ghana Regulation	Gaps Identified	Gap Bridging Actions
practices that integrate conservation needs and development priorities.	to the sites, and priorities for conservation.			
ESS8: Cultural Heritage				
○ To protect cultural heritage from the adverse impacts of project activities and support its preservation. ○ To address cultural heritage as an integral aspect of sustainable development. ○ To promote meaningful consultation with stakeholders regarding cultural heritage. ○ To promote the equitable sharing of benefits from the use of cultural heritage.	This standard sets out general provisions on cultural heritage preservation and recommends protecting cultural heritage from the adverse impacts of project activities. It addresses physical or tangible cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be in urban or rural settings, and may be above or below ground, or underwater. It also addresses intangible cultural heritage such as practices, representations, expressions, instruments, objects and cultural spaces that communities recognize as part of their cultural heritage. Projects involving significant excavations, demolition, movement of earth, flooding, or other environmental changes are to take cognizance of this standard.	The Fourth Republic Constitution (1992) recognizes culture as a necessary tool for national integration and development and, under the Directive Principles of State Policy (Article 39), declares as follows: (1) Subject to clause (2) of this article, the State shall take steps to encourage integration of appropriate customary values into the fabric of national life through formal and informal education and the conscious Introduction of cultural dimensions to relevant Aspect of national planning. (2) The State shall ensure that appropriate customary and cultural values are adapted and developed as an integral part of the growing needs of the society as a whole; and in particular, that traditional practices which are injurious to the health and well-being of the person are abolished. (3) The State shall foster the development of Ghanaian languages and pride in Ghanaian culture. The Ghana cultural policy (2004) enjoins the National Commission on Culture to undertake the following actions to protect and preserves monument, forests reserves, national parks and recreational facilities	The regulations and policies do not address cultural heritage as an integral part of sustainable development and promotion of equitable sharing of benefits	The National commission on culture provides a platform for collaboration with Chiefs, opinion leaders and community representatives and other institutions to protect cultural assets. The project will go by the procedures outlined by the Commission in respect of cultural assets. The project will also go the extra mile to complement this collaboration with stakeholder engagement procedures enshrined in the SEP to educate the project communities to appreciate the role of cultural values and assets in sustainable development and also the need to share benefits accruing from the use of cultural assets. A chance find procedure will be established as part of the ESMP
ESS10: Stakeholder Engagement and Information Disclosure				
○ To establish a systematic approach to stakeholder engagement that will help	ESS10 seeks to encourage open and transparent engagement between the Borrower and the project	○ The key laws most relevant to stakeholder engagement are:	The regulations to the RTI Act, has not been developed to fully operationalize mechanisms for	○ The project has developed a SEP that also includes a GRM based on an existing grievance

Scope/Objective	Description of Bank Policy	Description of Government of Ghana Regulation	Gaps Identified	Gap Bridging Actions
Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties. To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance ○ To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them. ○ To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format. ○ To provide project-affected parties with accessible and inclusive means to raise issues and grievances and allow Borrowers to respond to and manage such grievances.	stakeholders including project-affected parties throughout the project life cycle. The standard establishes a systematic approach to stakeholder engagement that potentially helps the Borrower to identify stakeholders and build and maintain a constructive relationship with them, as well as disclose information on the environmental and social risks and impacts to stakeholders in a timely, understandable, accessible and appropriate manner and format. It recommends that stakeholder engagements are commenced as early as possible in the project development process and continued throughout the lifecycle of the Project. This allows for stakeholders' views to be considered in the project design and environmental and social performance. The Borrower is also expected to implement a grievance mechanism to receive and facilitate resolution of concerns and grievances.	○ Article 21(1) (f) of the 1992 Constitution of Ghana which recognizes the right to information for all citizens as a fundamental human right. To fully operationalize the right to information, people need to be effectively engaged and provided with information on issues that affect their lives. ○ The *Right to Information Act, 2019 (Act 989)* is meant to put into effect the aforementioned article in the constitution of the Republic of Ghana. ○ *Articles 40 to 48 of the Local Governance Act, 2016 (Act 936),* mandate local authorities to create opportunities for residents and other stakeholders to access information and to participate in decision making and for inclusion of marginalized groups. ○ Stakeholder engagement is an integral part of the Environmental Impact Assessment process. The LI 652 requires effective public consultation and participation as an integral component of Environmental Impact Assessment (EIA) in Ghana. ○ Strategic goal 4 of the National Environmental Policy, which focuses on participation and coordination in environmental governance, charges the lead institutions in environmental governance to ensure active participation in all environmental matters.	disclosure or dissemination of information and grievance redress.	redress mechanism for resolving grievances for the project ○ The GRM is a decentralized and transparent system which ensured quick resolution of complaints and disputes, it also has the structure for disclosing vital information to requisite stakeholders ○ It also provides means for effective and inclusive engagement. This instrument which satisfies almost all the requirements of ESS 10 will be applied during the project implementation to bridge the gaps in national regulations and policies

2.6 Institutional Framework

Key institutions involved in the project include:

- Environmental Protection Agency (EPA)- PIU;
- Metropolitan/Municipal/District Assemblies (MMDAs) and the Physical Planning Department;
- Minerals Commission (MC);
- Lands Commission (LC);
- Office of the Administrator of Stool Lands (OASL);
- Traditional Authorities.

2.6.1 Environmental Protection Agency (EPA)- PIU

The EPA is established under the EPA Act, 1994 (Act 490) and is responsible for the protection of the environment and this include the human/ socioeconomic environment as well. The Agency is under the Ministry of Environment, Science, Technology and Innovation. Its functions include the following amongst others:

- Advise the Minister on the formulation of policies on all aspects of the environment and in particular make recommendations for the protection of the environment;
- Ensure compliance with any laid down environmental impact assessment procedures in the planning and execution of development projects, including compliance in respect of existing projects;
- Act in liaison and co-operation with government agencies, district assemblies and other bodies and institutions to generally protect the environment; and
- To promote effective planning in the management of the environment.

The EPA is the main government body for receiving and reviewing all Environmental and Social Impact Assessment reports. Currently, Resettlement Plan reports sent to the EPA for review are usually attached to the mainstream Environmental Impact Assessment (EIA) Reports. The Agency is yet to develop a general guideline or format for the preparation of a Resettlement Plans as it has done for the preparation of an EIA report. The EPA has offices in all the previous ten (10no.) regions of Ghana and zonal offices which takes care of a cluster of districts.

2.6.2 MMDAs and the Physical Planning Department

The Local Governance Act 2016, Act 936 establishes and regulates the local government system and gives authority to the MMDAs to exercise political and administrative power in the districts, provide guidance, give direction to, and supervise all other administrative authorities in the districts. The MMDAs are under the Ministry of Local Government, Decentralization and Rural Development (MLGDRD).

The MMDAs are mandated to initiate programs for the development of basic infrastructure and provide municipal works and services as well as be responsible for the development, improvement and management of human settlements and the environment in the district.

The Land Use and Spatial Planning Authority (LUSPA) is responsible for sustainable development of land and human settlements through a decentralized planning system, and currently operates at the regional and district levels, with the responsibility for designing plans (planning schemes) and controlling settlements.

LUSPA, as a decentralized institution, forms part of the District Assembly structure as the Physical Planning Departments, which replaced the erstwhile Town & Country Planning Department; and at the regional level as the Regional Land use and Spatial Planning Authority.

The Physical Planning Departments, which have the mandate of planning schemes and controlling settlements, would lead the DAs in the land acquisition process.

2.6.3 Minerals Commission (MC)

The MC is mandated under the Minerals Commission Act 1993, Act 450 with responsibility for the regulation and management of the utilization of the mineral resources of Ghana and the

coordination and implementation of policies related to mining in the country. As stipulated in Act 450, the MC functions are to:

- formulate recommendations of national policy for exploration and exploitation of mineral resources with special reference to establishing national priorities having due regard to the national economy;
- advise the Minister of Lands and Natural Resources on matters relating to minerals;
- monitor the implementation of laid down Government policies on minerals and report on this to the Minister;
- monitor the operations of all bodies or establishments with responsibility for minerals and report to the Minister;
- receive and assess public agreements relating to minerals and report to Parliament;
- secure a firm basis of comprehensive data collection on national mineral resources and the technologies of exploration and exploitation for national decision making; and
- perform such other functions as the Minister may assign to it.

In fulfilling its functions, the Commission engages in the following activities;

- Investigate the background, process applications for mineral rights and recommend their grant or otherwise to the Minister responsible for Mines;
- Review agreements relating to minerals;
- Collect, collate and analyze data on the operations of mining companies for decision making and for dissemination;
- Organize and attend workshops/seminars/conferences, as well as issue publications to promote mineral sector activities;
- Liaise with other governmental agencies, notably the Bank of Ghana and the Ghana Revenue Authority), to ensure that the spirit of the sector's fiscal regime is maintained; and
- Liaise with other governmental agencies, notably the Geological Survey Authority (GSA) and EPA, to monitor and ensure the adherence of mining companies to the terms and requirements of mineral rights granted to them; etc.

2.6.4 Lands Commission (LC)

The LC currently has the following Divisions:

- Public and Vested Lands Management;
- Land Valuation;
- Land Registration; and
- Survey and Mapping.

Public and Vested Lands Management Division of the Lands Commission

The Public and Vested Lands Management Division of the Lands Commission is the principal land management organization of the government. All public land is vested in the President of Ghana and held in trust by him for the people of Ghana. The Public and Vested Lands Management Division manages all public land on behalf of the President. In each of the regions of Ghana (occur for the previous ten regions and new offices yet to be created for the new 6 regions), a branch, known as the Regional Lands Commission, performs the functions of the Lands Commission. In addition to managing public lands on behalf of government, its other mandates include among others providing:

- Advise the government and local authorities on policy matters, and to ensure that the development of individual parcels of land is consistent with area development plans; and
- Advise on and assist in the execution of a comprehensive program of land title registration.

The acquisition of any rights of exclusive possession over public lands would necessitate discussions with the relevant Regional Lands Commission for a lease over the selected site.

Land Valuation Division (LVD)

It was established in 1986 (PNDC Law 42) as the Land Valuation Board (LVB). However, the LVB was brought under the Lands Commission as the Lands Valuation Division (LVD) with the promulgation of the Lands Commission Act 2008, Act 767. The LVD is responsible for all valuation services for the government, including assessing compensation to be paid as a result of land acquisition or damage to an asset in view of a government project.

The Division keep rates for crops, which are applicable nation-wide. The LVD has offices in all sixteen (16no.) regions of Ghana and over 44 district offices. The district offices are involved only in 'rating valuation' and that any valuation-taking place has to be undertaken by the Regional offices, which have certified valuers. The LVD also keep records of private sector certified valuers.

Land Registration Division of the Lands Commission

It was established in 1986 as the Title Registration Advisory Board under Section 10 of the Land Title Registration Act, 1986. However, it was brought under the Lands Commission as the Lands Registration Division with the promulgation of the Lands Commission Act 2008, Act 767. The Division ensures registration of title to land and other interests in land; maintains land registers that contains records of land and other interests in land; ensures registration of deeds and other instruments affecting land, among other functions.

Survey and Mapping Division of the Lands Commission

It was established in 1962 under the Survey Act 1962, Act 127 as the Survey Department. The Department was brought under the Lands Commission as the Survey and Mapping Division with the promulgation of the Lands Commission Act 2008, Act 767. The Division supervises, regulates and controls the surveys and demarcation of land for the purposes of land use and land registration. It also supervises, regulates, controls and certifies the production of maps. It is responsible for planning all national surveys and mapping among other functions.

2.6.5 Traditional Authorities

In the 1992 Constitution, chieftaincy together with its traditional councils is guaranteed and protected as an important institution in the country. This institution operates in tandem with the Ministry for Chieftaincy and Traditional Affairs, which is the official Ghanaian agency responsible, the creation of linkages between the Government of Ghana and the traditional authorities in the country.

In Ghana customary authorities (stools, skins, clans and families), own land predominantly. Together they own about 78% of all lands while the State owns about 20% with the remaining 2% owned by the state and customary authorities in a form of partnership (split ownership), (Larbi W O, 2008). Article 267 (1) of the 1992 Constitution avers that all stool lands in the country shall vest in the appropriate stool on behalf of, and in trust of the subjects of the stool in accordance with customary law and usage. All revenue from stool lands are collected and disbursed by the Office of the Administrator of Stool Lands (OASL).

2.7 Project Measures to Ensure Compliance with World Bank Policy

The Ghanaian laws and regulations make provision for environmental assessment and management, however, there are some differences between the World Bank ESS and Ghanaian laws as indicated in Table 2-7 supra.

In order to harmonize such differences and ensure effective management of the environmental and social impacts and risks arising out of the project implementation satisfies the World Bank requirements as well as the national laws.

The site specific ESMPs in addition to the ore characterization and mine reserve estimation aspects will combine the World Bank ESS and the national laws as well as institutional synergies for managing the impacts and risks of the project.

3.0 ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

This chapter presents the environmental and social baseline information of the project area of Tinga. The project area of influence includes the immediate area, which is the mining areas/ pits, ore processing areas and environs of Tinga. Description of the environmental settings includes the characteristics of the area in which the activity of the project would occur and the cover area likely to be impacted by anticipated environmental and social impacts and risks. The environmental and social information used to draft the baseline has been obtained through literature reviews, publicly available information and observations made during the field visits.

The Project is not a greenfield one but in an existing mining area where most of the natural features have been converted/ transformed, also due to farming and grazing. The chapter is subdivided into three major headings as follows:

- Physical Environment;
- Biological Environment; and
- Socioeconomic Environment.

3.1 Physical Environment

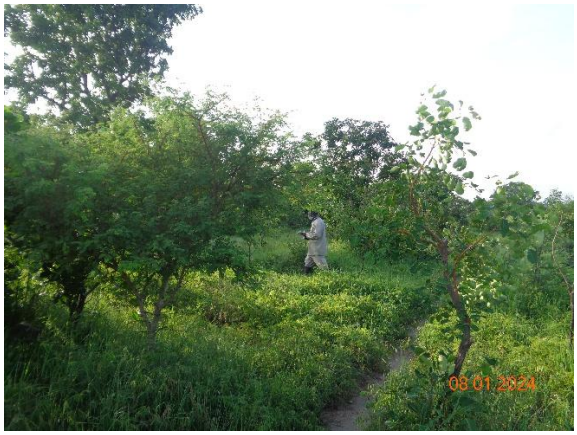
3.1.1 Location

Tinga (2°13'26.33"W and latitude 8°34'50.22"N) is a typical rural community located on the Bole-Bamboi highway in the Savannah Region of Ghana and located about 160km from the regional capital of Damongo (northeast) and about 60km from Bole the District capital (north). **Figure 3-1** is a map of the Bole District showing the location of Tinga.

3.1.2 The Tinga Project Site/ Land Use

The Tinga CMDC site is located approximately on 08°33'56.31"N, 002°09'24.91"W on the global scale. This land, along with access roads to the site, is within areas designated for Community Mining Scheme (CMS). The designation of a place for Community Mining Schemes (CMS) is done by the Minerals Commission of Ghana, in close consultation and involvement of relevant Traditional Authorities, District Assembly representatives and community people. In practice, such designated areas are free from any other uses and encumbrances, including farming activities. It is currently lying fallow with no activities on it. (see Plate 3-1). However, the general area is within the catchment of the Tinga Community Mining Scheme popularly referred to as "Wenchi-Wenchi".

The 0.94-acre land was acquired by GoG through a Voluntary Land Donation (VLD) arrangement with the Tinga community, led by the Traditional Authority. The donation followed the VLD Protocol through which it was confirmed that the donation was ~~not~~ completely voluntary, and that the owners (Tinga community) finalize the donation after they were duly informed about their right to refuse the donation and to be compensated for land so donated. No households were displaced by the donation.



a) Section of the Tinga CMDC Site

b) Section of the Tinga CMDC Site

Plate 3-1:Pictures Showing the Land Use at the Tinga CMDC Site

3.1.3 Geology and History of Mining in Tinga

Gold mineralization was first observed in the Tinga area by the inhabitants who were engaged in alluvial and eluvial gold mining activities. Their old diggings most probably attracted the attention of the early Europeans explorers to the area at the beginning of the century. The Gold Coast Geological Survey were among the first recorded workers to have conducted preliminary reconnaissance work in the area from 1925 to 1928. Gold Coast Selection Trust, a London Junior from 1932 to 1938 explored for gold in the area and opened a small mine at Bomburi (quartz reef mining). Bomburi village is circa 30km north of Tinga village.

Geologist from the Soviet Geological Survey conducted regional exploration in the area in the 1960's. The team mapped occurrences of an auriferous reef at Kui area circa 24 km east of Tinga and not far from the Tinga mining area.

Geologically, the Tinga prospect is underlain by hornblende granites, which have intruded into the sedimentary Maluwe Basin which is north-adjacent to the Bui Belt. The basin sediments include phyllites, schists, tuffs and greywackes. Gold mineralization is basically of the quartz vein type and associated with NE-SW shear/fracture zones within granitic rocks.

The Tinga area shares a similar exploration and mining history as that of Dakrupe. Substantial old artisanal workings are present. The area experienced the exploration boom of the 1930s as well as surveys undertaken by Russian prospecting teams in the 1960s.

Thereafter, modern exploration activities resumed in the area from the mid-1990s by companies such as Ashanti Goldfields/IAMGOLD Alliance (AGEM), Semafo and Volta Resources. Exploration activities by these companies included stream and soil geochemistry, trenching geophysics and drilling. The work identified 5 targets of which the Far East is the most prominent in terms of gold resources.

Just like Dakrupe, the Tinga area has seen significant small-scale gold mining activities.

3.1.4 Soils

There are various kinds of soils in the Bole district that support plant growth. The main types of soils include savannah ochrosols, tropical brown earth and terrace soils. The savannah ochrosols are generally poor in organic matter and nutrients because of the absence of dense vegetation caused by bush burning, overgrazing and poor farming practices in the area.

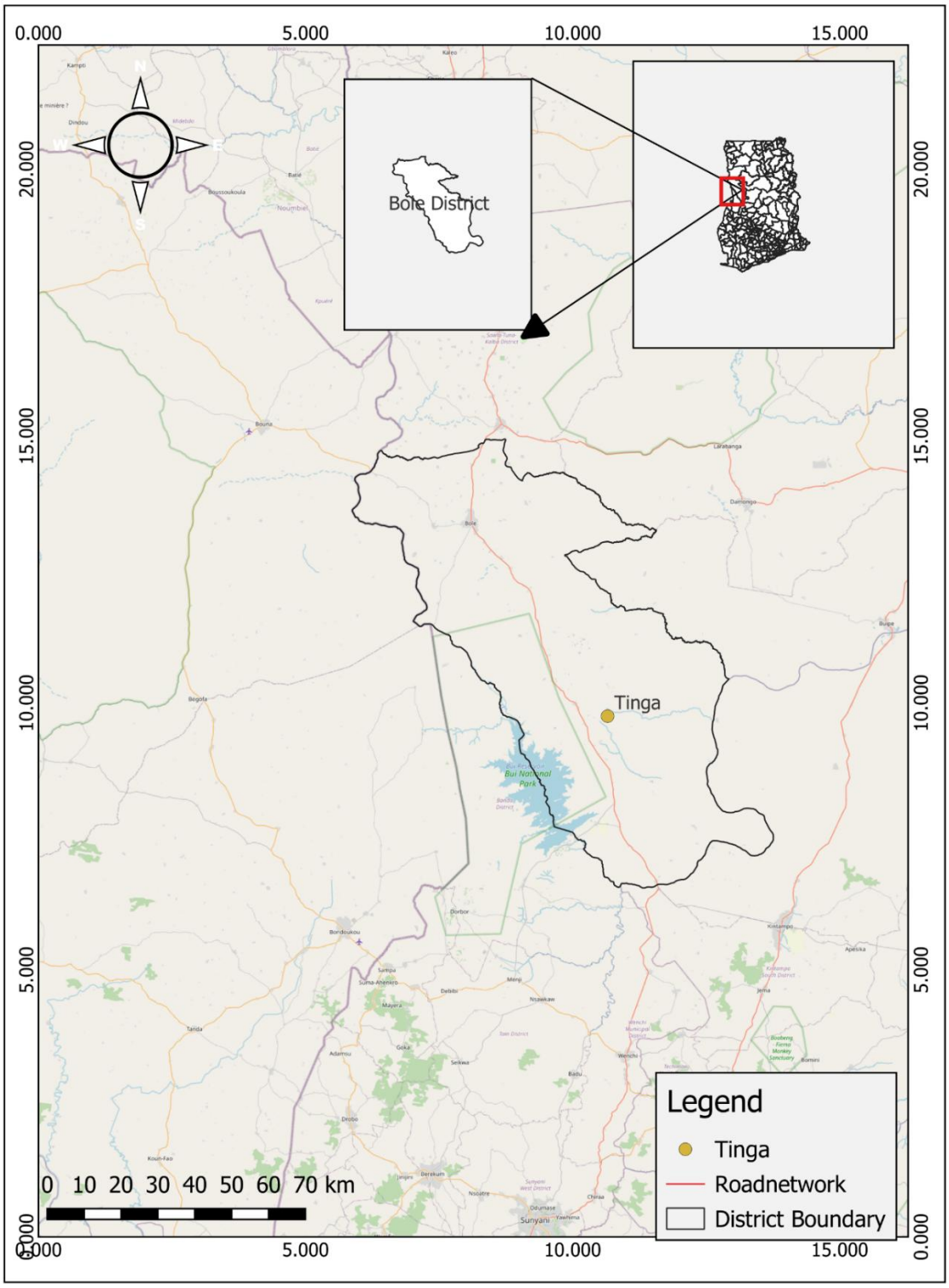


Figure 3-1: Map of the Bole District Showing Location of Tinga

3.1.5 Climate

The climate of the Project Area is determined by the movement of air masses which differ in air moisture and relative stability rather than temperature. Two air masses can easily be identified, the tropical continental air mass which moves from the Sahara Desert towards the sea and the tropical maritime air mass which moves from the South Atlantic Ocean towards the land.

Like most parts of the country, two main physical phenomena, the equatorial trough and the associated Inter Tropical Convergence Zone (ITCZ)/ Inter Tropical Boundary (ITB) influence the climatic conditions of the project area. The ITCZ/ ITB influences the attraction of the alternate

air masses from the north and the south called the tropical continental (northeast trade winds) and the maritime continental (southwest monsoon) winds respectively. The tropical continental winds are associated with a dry cool wind known as the harmattan which affects most part of the country during the months of December to February when it's very intense.

Climatic data, comprising monthly rainfall data, monthly temperatures and monthly relative humidity is provided in **Table 3-1** based on 20 years of data obtained from the Ghana Meteorological Agency (GMet) for Bole and the highlights are as follows:

- Relative Humidity in the Project area is generally high, averaging 65.5%. The average relative humidity ranged from 34.3% in January to 82.4% in August.
- Temperature in the Project area is generally high, averaging 27.1°C. Average maximum temperature is 32.6°C and a minimum of 21.6°C. The hottest months are February to May; and
- The rainy season occurs between March to October and peaks in September. The average annual rainfall is 1,060mm. The dry season, also known as the harmattan, occurs between November and February. This long period of dryness makes the Project area very vulnerable and susceptible to bush fires and drought.

Table 3-1: Climate Data for Bole (2003 2023) - 20 Years of Record

Parameter	Unit of Measure	Annual Total	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Precipitation	mm	1,060.4	1.3	16.8	54.5	101.4	120.8	140.0	133.0	155.3	206.0	110.9	15.5	4.9
Average No of Days with Precipitation	Days	86	0.3	1	4	7	10	11	11	13	16	10	2	1
Average Temperature	°C	-	27.1	29.7	29.6	29.8	28.6	27.0	26.1	25.8	24.8	25.7	26.0	25.3
Average Relative Humidity	%	-	34.3	39.8	55.4	67.1	73.8	78.6	80.8	82.4	81.9	76.4	67.9	47.7

Source: GMet

3.1.6 Surface Water (Drainage)

The Project area falls within the Sur River sub-catchment of the Black Volta River catchment. The Project area is principally drained by River named Chakpa. It is ephemeral and no water was in the stream channel during the fieldwork. The discharge from the Chakpa flows into the Black Volta downstream of the Bui Dam.

The Black Volta Basin is the third largest sub basin of the Volta System, after the Lower and White Volta Basins. It constitutes about 21% of the Volta System and occupies the western portions of Upper West, Savannah and Northwestern portions of the Bono Regions.

The Black Volta Basin is located approximately between longitudes 1.0°W and 2.9°W, and latitudes 7.5°N and 11°N. The Basin has a total catchment area of 142,056.32km^2 including catchments outside Ghana. The catchment area in Ghana is 33,302.2km^2 and the rest are in Cote d'Ivoire and Burkina Faso. There is considerable variation in local relief, varying from 150m to 300m and increasing from the south to the north. A considerable length of the northern reaches of the Black Volta in Ghana forms the boundary between Ghana and the Cote d'Ivoire. The major tributaries are the Sur, Yerada, Chakpa, and the Lambo.

The Black Volta lies mainly in the northern savanna zone except for the southern portion in the Bono Region, which lies in the transitional zone of secondary forest and scrub. Annual rainfall in the basin varies from about 1,143mm in the north to about 1,270mm in the south. Pan evaporation is of the order of 2,540mm/year. The average annual runoff from the Black Volta is about 217m^3/s following the construction of the Bui Dam at Bui for hydropower generation by the Bui Power Authority (BPA).

3.1.7 Air Quality Assessment

As part of the preparation of the ESMP, ambient air quality assessment was carried out at specified locations in the Project area in August 2024 using the Osiris Particulates Monitor for dust and the Aeroqual series 500 for noxious gas measurements (**see Plate 3-1**). The detail report of the assessment is provided as **Annex 3-1** of this ESMP.

Plate 3-2:The Osiris Particulates Monitor at Location AN2 (Demarcated CMDC Site)

The main objective of the air quality assessment is to provide a basis for determining the impacts on human health and the environment as a result of the implementation of the Project. The sampling locations were so chosen because they were close to the project site and associated facilities- the mining and ore processing locations. The locations also ensured the safety and security of personnel and equipment. The selected sampling locations/sites are provided in **Table 3-2.** The sampling locations have been shown in **Figure 3-3**. The parameters of interest were Total Suspended Particles (TSP), PM_{10} and $PM_{2.5}$ (Inhalable particles, diameter <10 µm and diameter <2.5 µm respectively), Sulphur Dioxide (SO_2) and Nitrogen Dioxide (NO_2).

Table 3-2: Ambient Air and Noise Monitoring Locations

ID	Sampling Site	Coordinates
AN1	The main pit Site	08°33'51.0"N, 002°09'13.4"W
AN2	Demarcated CMDC Site	08°33'56.31"N, 002°09'24.91"W
AN3	Alternative CMDC Site	08°34'17.2"N, 002°10'19.9"W

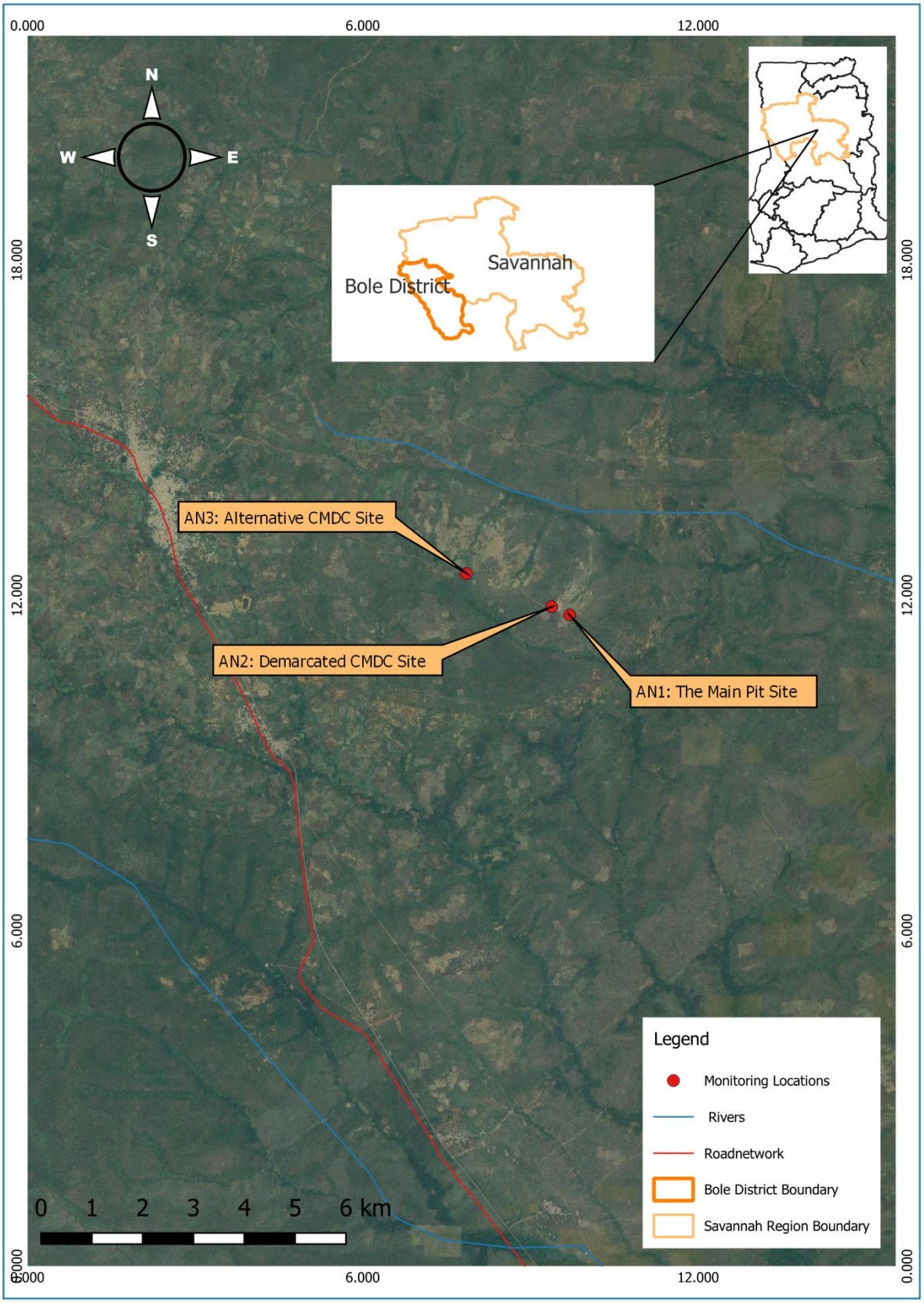


Figure 3-2: Ambient Air, Noise Monitoring Locations at Tinga

The results of the air quality monitoring exercise are shown in **Table 3-3**. The prevailing wind direction during the air quality monitoring periods was from South-West to North-East. The detail report of the assessment is provided as **Annex 3-1** of this ESMP.

Table 3-3: Ambient Air Quality- (monitored 1st August, 2024)

ID	Sampling Site	TSP/ μgm^{-3}	PM_{10}/ μgm^{-3}	$PM_{2.5}$/ μgm^{-3}	NO_2/ μgm^{-3}	SO_2/ μgm^{-3}
AN1	The Main Pit Site	103.9	50.1	10.3	1.232	21.390
AN2	Demarcated CMDC Site	35.7	18.3	5.6	1.490	14.722
AN3	Alternative CMDC Site	36.2	17.1	4.8	0.520	11.141
GS 1236:2019- Ambient Air Pollutants		**150.0***	**70.0***	**35.0***	**150.0***	**50.0***
WHO Guideline Value		**na**	**50.0***	**25.0***	**200.0***	**50.0***
WBG Guideline Value		**na**	**50.0***	**25.0***	**200.0****	**20.0***

*…….24 hours averaging time **……..1 hour averaging time

GS 1236:2019 is "Environment and Health Protection- Requirements for Ambient Air Quality and Point Source/ Stack Emissions"

The results show that:

- Dust levels in the ambient air ranged from 35.7μgm^{-3} at the Demarcated CMDC Site to 103.9μgm^{-3} at the Main Pit Site for TSP compared with the GS value of 150μgm^{-3} and from 17.1μgm^{-3} at the Alternative CMDC Site to 50.1μgm^{-3} at the Main Pit Site for PM_{10} compared with the GS value of 70μgm^{-3}. $PM_{2.5}$ values ranged from 4.8μgm^{-3} at the Alternative CMDC Site to 10.3μgm^{-3} at the Main Pit Site.
- Noxious gases emission was within the respective GS values. SO_2 was 11.141μgm^{-3} at the Alternative CMDC Site to 21.390μgm^{-3} at the Main Pit Site compared with the GS value of 50.0μgm^{-3}, while NO_2 ranged from 0.520μgm^{-3} at the Alternative CMDC Site to 1.490μgm^{-3} at the Demarcated CMDC Site, compared with the GS value of 150.0μgm^{-3}. However, SO_2 was in excess of the WBG Guideline value of 20μgm^{-3} at the Main Pit Site.
- PM_{10} for the Main Pit Site was in excess of the WHO and WBG Guideline value of 50μgm^{-3} respectively, which may be attributable to the blasting and the movement of motor bikes and tricycles on the dusty road at the Main Pit Site. All the other parameters showed values below the respective WBG and WHO guideline values.

3.1.8 Noise Assessment

As part of the preparation of this ESMP, ambient noise assessments were carried out at the air quality monitoring locations in the Project area in August 2024. The noise monitoring was carried out for daytime only. The sampling locations are same for that of the ambient air quality (see **Figure 3-3**). Noise measurements at the sites were determined using the portable Pulsar Nova Integrated Sound Level Meter which enables real-time monitoring of the noise (**see Plate 3-2**).

Plate 3-3:The Noise Monitor Positioned at AN1 (The Main Pit Site)

Measurements were done in line with GS 1253:2018, and Noise Levels were captured in situ in decibels on the A scale, i.e., dB(A). The noise monitoring results are provided in **Table 3-4**, and compared with the GS value for Mixed Used Areas.

Table 3-4: Noise levels- (monitored 1st August, 2024)- measurements done in line with GS 1253:2018

ID	Sampling Site	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
AN1	The Main Pit Site	63.2	70.5	53.4	67.1	60.0	55.5
AN2	Demarcated CMDC Site	46.0	57.6	39.6	47.9	45.1	42.5
AN3	Alternative CMDC Site	45.8	58.1	37.9	46.7	44.5	41.3
GS 1222:2018 (Mixed Use)		**60.0**					
WHO Guideline Value (Industrial, Commercial Shopping and Traffic Areas, Indoors and Outdoors)		**70.0**					
WBG Guideline Value (Industrial, Commercial)		**70.0**					

Legend
L_{EQ} Equivalent Sound Level representing the average integrated sound level accumulated during the sampling period
L_{MAX} Maximum Sound Level obtained during the sampling period
L_{MIN} Minimum Sound Level obtained during the sampling period
L_{10} Nuisance noise level during the sampling period
L_{50} Average noise level recorded during the sampling period
L_{90} Background noise level recorded during the sampling period
GS 1222:2018 is "Health Protection- Requirements for Ambient Noise Control"
GS 1253:2018 is "Acoustic- Guide for Measurement of Outdoor A-Weighted Sound Levels"

The results showed that:

- Equivalent Noise Levels (Leq) ranged from 45.8dB(A) at the Alternative CMDC Site to 63.2dB(A) at the Main Pit Site compared with the GS value of 60dB(A) for a mixed use Area and 70dB(A) for WHO Guideline Value (Industrial, Commercial Shopping and Traffic Areas, Indoors and Outdoors) and WBG Guideline Value (Industrial, Commercial).
- The Lmax values recorded ranged from 57.6dB(A) at the Demarcated CMDC Site to 70.5dB(A) at the Main Pit Site.

3.2 Biological Environment

3.2.1 Terrestrial Flora

The Project area, Tinga in the Bole District of the Savannah Region, lies in the northern Guinea Savanna vegetation zone of Ghana (Taylor, 1960; Innes, 1977). This vegetation is characterized by a continuous grassy ground layer with an open canopy tree stratum. The vegetation is thus open in several places. The ground layer is annually or periodically burnt. Parts of the area have been intensively farmed.

The vegetation of this zone is characterized by trees such as *Parkia biglobosa*, *Vitellaria paradoxa, Burkea africana, Daniellia oliveri, Afzelia africana, Parinari polyandra, Hymernocardia acida, Vitex doniana, Terminalia glaucescens, Lophira lanceolata, Piliostigma thonningii* and *Diospyros mespiliformes*. The common grasses of the Guinea Savanna-Woodland are *Andropogon* sp., *Brachiaria brevis, Digitaria gayana, Eleusine indica, Eragrostis aspera, Hyparrhenia* sp., *Pennisetum pedicellatum, Schizachyrium* sp., *Rottboellia* sp., *Cymbopogon giganteus* and *Panicum* sp. Places that are heavily farmed and thus of low fertility usually have short wiry grass species e.g. *Aristidia kerstingii, Ctenium elegans, Schoenefeldia gracilis, Schizachyrium exile, Hyparrhenia* sp. and *Monocymbium ceresiiforme*.

The terrestrial flora and fauna survey was carried out in the Project area as part of this ESMP formulation. The field survey was conducted on 1st August 2024.

The detailed flora survey methods are provided in **Annex 3-2,** and consisted of literature reviews and field surveys. The field survey sample location coordinates and profiles are presented in **Table 3-5.**

Table 3-5: Coordinates of Sampling Locations and Associated Vegetation Types

Sample No.	Latitude (N)	Longitude (W)	Elevation (m.a.s.l)	Description
1	08.56420	002.15360	224	Degraded woodland with isolated trees and mine pits
2	08.57143	002.17217	249	Woodland with open canopy

The sample site data gathered and analysis are respectively presented in Appendices 1 and 2 of **Annex 3-2**. Specimens of species that could not be readily identified in the field were identified in the Ghana Herbarium. Nomenclature followed Flora of West Tropical Africa (Hutchinson and Dalziel, 1972). The conservation status of the species encountered were defined using the Star Rating system adopted in the Forest Reserves of Ghana Geographic Information Exhibitor manual (Hawthorne, 1995) and the IUCN Red list of threatened species categories.

The objective was to conduct a terrestrial ecology study within the proposed project site of about 0.38ha and other adjoining areas to monitor the changes in flora and fauna of the project area. The study addresses structure and composition, focal habitats (i.e. sites important for biodiversity), and focal species, with particular attention paid to the status (abundance and distribution of identified species of conservation concern). The scope of the study covered:

- terrestrial flora studies, including comparison of structural characteristics of current and baseline vegetation conditions such as occurrence of large trees and trees known to be important for biodiversity and presence of regeneration, coarse woody debris or deadwood, and other elements specific to the agroecological zone, such as anthills, etc.
- focal habitat sites especially those important for biodiversity e.g. for shelter, feeding or reproduction and monitoring and management recommendations for their maintenance and enhancement. Examples of such sites include wetlands, streams, marshes, etc.
- focal species – status of species of national and regional conservation concern and the level of awareness about occurrence, status, condition, and abundance.
- terrestrial fauna studies to monitor changes in terrestrial fauna of conservation importance in the project area.
- impacts and threats – among others, this should assess presence of trees of commercial or local value, presence of invasive species, evidence of fires, illegal hunting, poisoning, capturing or collecting, vegetation clearance for charcoal production, etc.

The detailed results of the flora survey carried out are summarised as follows:

- The project site has a gently undulating topography with well drained soils. Most of the area has been mined out. The CMDC site at Tinga is close to the mined-out areas showing degraded landscape with mined out pits and isolated trees while some portions of the area has open canopy woodland and secondary thickets vegetation.
- The open canopy woodland and secondary thickets have tree species such as *Vitellaria paradoxa, Combretum adenogonium, Daniellia oliveri, Afzelia africana, Nauclea latifolia, Parkia biglobosa and Vitellaria paradoxa*. The shrubs and herbs common to the site include *Cassia mimosoides, Cleome viscosa, Hyptis suaveolens, Sporobolus robusta* and *Tephrosia elegans*.
- The species list compiled for the 2 sample sites is presented in Appendix 2 of **Annex 3-2**. The survey recorded 28 species in 26 genera belonging to 14 families of flowering plants. The dominant families were the Fabaceae (7), Poaceae (5) and Combretaceae (3). These three families accounted for about 54% of the species recorded. All other families had less than 3 species present. The vegetation of the site is low in species diversity due to the mining activities which have left several areas degraded.
- The life form composition of the flora showed a dominance of tree species (50%) in the project area of influence followed by the Herbs and Shrubs with 25% each. No climbers were recorded at the project area.
- No alien invasive species was recorded at the Tinga project area.

3.2.2 Fauna Survey

The faunal list of the project area is based on the information gathered from various methods (interviews, desk surveys and direct observations), and is presented in Appendix 3 of **Annex 3-2** of this ESMP. According to the hunters interviewed, most of the large mammals, which were common in the area, have moved further away into the Mole National Park due to human activities such as farming, grazing and mining. Notable among these are the elephant, lion, leopard, warthog, several parrots, terns, songbirds (passerines), land tortoises, pythons and other snakes, lizards, bats, birds of prey, mongooses, bovids (e.g. the African buffalo and several

duikers), egrets, ducks and pigeons. A number of the species known to occur in the area are of both national and global (IUCN, CITES) conservation significance.

3.3 Social Environment

This section describes the socio-economic characteristics of the project area.

3.3.1 Socio-Economic Conditions of the Project Community- Tinga

History of the Community: The Project site (Tinga-Wenchi) is located approximately 10km east of Tinga town. Tinga is a town in the Bole District of the Savannah region, and also lies within the Guinea Savannah agro-ecological zone. Tinga is a town with one of the most diverse ethnic groups living side by side. The town has Gonjas, Bandas, Nafaanas, Walas, Dagombas, Sissalas, and Mos as the indigenous people. Walas from Wa form the overwhelming majority, about 70% are from Wa. The main economic activity is farming, with about 70% of the labor force engaging in it. Over the last few years Tinga has become the hub of small-scale mining and trading in the Bole area, attracting hundreds of people from all walks of life. Currently, it is the second largest and second most populated in the Bole district after Bole, as a result of the movement of thousands of people to the area to prospect for gold. With a population of over ten thousand people, Tinga is seriously faced with issues of environmental degradation and crime such as armed robbery targeted at miners and gold buyers. Artisanal small-scale mining is done at the Tinga-Wenchi (Wenchi-Wenchi) cooperative small scale mining site.

The Project Site: An inspection of the site earmarked for the CMDC revealed that the site was far removed from the Tinga community. It is a one-hectare land with no potential for resettlement (**see Plate 3-3**). There were neither houses nor farms located nearby. There were a couple of Shea trees and mostly shrubs. A couple of goats were seen grazing on the land.

Plate 3-4:The Site Earmarked for the Proposed CMDC at Tinga

Miners have set up squatter settlement of improvised buildings at Wenchi-Wenchi as their living abode. These make-shift structures are made of materials such as mud and wood, or from cheap

building materials such as corrugated tin and rubber sheets. The settlement lacks adequate infrastructure, including proper sanitation, safe water supply and electricity.

Demographics: Most of the miners are between the ages of 18 to 35 years. About 80% are within this age bracket, 20% are above 40 years. More than 80% of the population at the site are men, and 60% of these men are married, while 15% are also cohabiting with women. The interactions revealed that about 75% of the miners were Wala's from Wa, there are also Sissalas, Frafras ,Daogombas and Kussasis. Their educational background is mostly up to senior high school level.

Household Size, composition and structure: The community has circa 420 households. The average household size in the community is 5 persons. Children constitute the largest proportion of the household structure.

Literacy and education: Of the population 11 years and older, 43% are literate and 55% are non-literate. The proportion of literate males is higher (51%) than that of females (38%).

Type of settlement: It is estimated that 20% of the miners live in dwelling units in Tinga town and commute to work at Wenchi-Wenchi. This category of people live in compound houses or semi-detached houses. More than 80% of the miners live at the site in improvised structures made up wood and rubbers sheets. A few of the buildings have wattle and daub walls in which vertical wooden stakes, or wattles, are woven with horizontal twigs and branches, and then daubed with clay or mud.

Utilities: The main sources of lighting in dwelling units in the community are flashlight/torch since there is no electricity. The main source of fuel for cooking for most households is charcoal (60%) and firewood (40%). The main sources of water in the settlement for domestic use water collected in dugout and abandoned pits. The only source of drinking water is sachet water sourced from women traders who sell at the site. The site has no toilet facility; hence people use the bush (free range). Solid waste is also disposed of indiscriminately.

Land use: Land is owned by families, clans and chiefs (in trust for the people). The chiefs are however custodians of uncultivated lands. Thus, migrants will have to gain right to use the land through the chiefs. The family head could however give the right to the use of a relatively small piece of land but if large tracts of land are required the chief with jurisdiction over the entire land area gives the right to use (Dittoh, 2013).

Tricycles: The main means of transportation in the community is tricycle (**see Plate 3-4**). Result of the survey revealed that over 100 tricycles are being used at the Wenchi Wenchi site. Several young men are engaged in driving these tricycles which are taxi-like modes that rely on comparatively slow, lightweight vehicles that provide lower quality services than exclusive ride taxis, although at considerably cheaper fares. There are two main types of tricycles in the community which are used for commercial purposes. They are the passenger tricycle or *Pragia* as they are popularly known, and freight tricycle which is also popularly known as Aboboyaa or *Motor King*. The latter is used largely for carting lode and gold ore.

Plate 3-5:Tricycles Used by Inhabitant for Transporting Lode/ Ore

Mining: According to key informants interviewed, the Tinga Community Mining Scheme was launched in October 2020. It was noted that the Community Mining Scheme is one of three main government programs developed to address the worrying trends in the sector, such as illegal mining, environmental degradation, water pollution and other matters impacting human health and safety, and the Wenchi-Wenchi Cooperative mining site in the Tinga mining area is 1 of 6 licensed small-scale mining sites in the North of Ghana.

Mining, legally registered as community mining scheme is the major economic activity, employing over 80%t of the active adult population. The artisanal underground mining being done here involves mining of hard rock deposit. This process requires drilling of holes in the rock and feeding these holes with explosives. The charged rocks are then exploded and the gold ore deposits are conveyed to the surface by men, known as "loco boys" for onward processing. A typical pit known as "ghetto" has an average of twenty-one (21) workers, comprising of one (1) Blast man, six (6) Chiselers, thirteen (13) loco boys and a cook who prepares meals for these workers. This group of workers is managed by a "ghetto owner" who is the owner and financier of the mining operations.

The profitability of the operation to a large extent depended on their geographical knowledge of the ore bearing rocks. Engagements with the miners revealed that they had a lot of tacit understanding about the site's geology. They elaborated on the mines many levels, its depth and span of the underground tunnels. The pits have ventilation machines that supply air to the underground spaces, where miners do the drilling and chiseling. There is water pumps stationed on the surface that are used to dewater the pits in the event that the pits get flooded. It is this same underground water source that is used to process the gold. The vegetative cover of the entire site has been cleared, exposing the workers to the harsh weather conditions. Noise pollution at this site is very pronounced. Personal safety protocols were lacking at the site. Apart from a few who were spotted wearing helmets, there were no other PPEs. There was no first aid kit on the site in case of an accident or emergency.

Due to the unavailability of electricity at the site, all equipment are either ran on petrol or diesel. Depending on the workload, a weekly average amount of GHS300.00 and GHS1,150.00 is spent on petrol and diesel respectively. There are also recurrent expenses on drill bits, explosives, food and minor repairs. Total operational expenses on one "ghetto" per week averages GHS10,000.00.

During the interviews, the men admitted to the crucial role women play at the site (**see Plate 3-5**). Casual miners noted that women who come to the site to purchase their weekly share of the gold ore were helping them in no small way to cater for their families.

Plate 3-6:Scenes from the Wenchi-Wench Mining Site Showing the Involvement of Women in the Business

Women in Mining: Women are an integral part of the mining process (**see Plates 3-5 & 3-6**). Based on demographic data collected during the focus group discussion (FGD), majority of the women (90%) are aged between 19 and 50, with 40% of them of childbearing age - between 19 and 35. A few were over the age of 50 and 55 years. Most (50%) are married, and 40% of them live with men though they are not married, and 80% live in male-headed households. They mostly speak local languages such as Sisala (40%), Twi (25%) and Gonja (30%).

The women are mostly migrants who have come for work; most of the women engaged in the mining are from Damongo and Larabanga, others are Dagaatis. They claim the job is tedious but they can't leave because there is no other source of livelihood that is more rewarding in the area. Most of them have been working in the mines for about a year. Some of the women say the cost of remittances, feeding their families and personal care are the three items that consumes a greater part of their income.

Women undertake some of the most critical aspects of the production chain yet they are among the least paid. Women are also the most adversely affected group both socially and economically in the mining community, though they undertake critical roles as ore crushers, washers and processers. The exploitation of women from buyers and their male counterparts, stems from the fact that they are not educated enough to be able to benefit fully from the venture. Their lack of knowledge about effective mining techniques leads to lost earnings. They also lack the financial resources to be able to make greater profit. Since most of the women are burdened with the responsibility of fending for their children, they tend to accept any offer, further impoverishing them.

Plate 3-7:Women Involvement in Transportation and Processing the Ore at Tinga (Wenchi-Wenchi)

There are roles typically reserved for women at the various "ghettos". After the ore has been brought from the pits, it is the women's responsibility to dry the rocks and send them to the crushers for the initial crushing. They then send the crushed rocks for smoothening which is a secondary crushing process. They then carry the powdered material to the washing plant for men to take over the remaining of the extraction process.

A few of the women noted that they were engaged in other economic activities before venturing into mining. They indicated that mining seems to be the most lucrative venture under the current circumstances. During this engagement it was noted that almost 90% of the women depend solely on mining for their livelihood.

Women have insufficient social protection mechanisms to financially safeguard themselves and their families. The women are not organized or mobilized in a group for greater collective action on their socioeconomic challenges. There is also lack of childcare and sanitation facilities at the Wenchi-Wenchi site, further creating challenges for women and their young children. They also work with mercury which exposes them to substantial health risk; they sometimes keep the mercury at home and this endangers the health of their families and their community. It was noted from the discussions that women suffer gender-based violence, being the weaker sex, they believe their male counterparts sometimes pick on them and gain unfair advantage.

Children in Mining: No children were found working at the site. This may be due to the fact that the site is far removed from the Tinga town.

Health: Through interactions with these miners, it was clear there were a lot of miners with respiratory conditions. They mentioned cough as a prevalent health condition. The consumption of energy drinks with high sugar content was common and the poignant smell of cannabis filled the air, pointing to its rampant use at the Wenchi-Wenchi site. A makeshift health post being operated by a private individual was closed at the time of this engagement (**see Plate 3-7**).

Dominant ailment reported in the community are malaria, diarrhea, urinary tract infection, upper respiratory tract infection, peptic ulcer and skin diseases.

Plate 3-8:Makeshift Health Post at the Wenchi-Wenchi Site

Education: Only few of the male miners (30%) have any form of formal education. The situation is worse among the women; only about 10% have had formal education.

4.0 STAKEHOLDER CONSULTATIONS AND DISCLOSURE

The World Bank ESS and the Ghana Environmental Assessment Procedures for the conduct of ESIA/ EIA or ESMP/ EMP studies respectively require the involvement of all relevant stakeholders in the process. This is aimed at providing opportunities for especially Interested and Affected Parties (I&AP) e.g., Project Affected Persons (PAPs) and all public and private groups including local Non-Governmental Organizations (NGOs) with interest or concern for various aspects of the project to participate in the successful formulation and implementation of all aspects of the project.

4.1 Stakeholder Engagement Objectives

Stakeholder participation in project planning, design and implementation is now widely recognized as an integral part of ESMP preparation in order to assure project success. Local communities, their representatives, government, national and international NGOs may all be able to contribute to (and benefit from) dialogue directed at identifying and resolving key project-related issues.

The objectives of the engagement exercise are to:

- provide information related to the activities of the proposed project;
- facilitate and maintain dialogue,
- seek participation of all interested parties;
- identify stakeholder interests as well as issues including community concerns and expectations;
- support participation in the project decision-making process and design;
- create solutions for addressing any concerns and integrating them into project design, operations, and management; and
- enhance the project by learning from, and incorporating the expertise of individuals, professionals, communities and organizations.

4.2 Stakeholder Engagements Activities

A number of stakeholders have been identified and engaged (**see Annex 4-1**). Stakeholders engaged thus far included national, regional and district authorities, the Tinga Community Mining Committee, miners and millers and gold dealers.

4.3 Stakeholder Methodology and Tools

During the stakeholder engagement process the following information dissemination and data gathering tools and methodologies were adopted:

i. **Focus Group Discussions (FGDs):** FGDs were carried out with community members, and District Assembly Officials. Each group was engaged separately and asked a series of questions and requested to raise any issues of concern and expectations of the project.
ii. **Key Informant Interviews (KIIs):** Key informants interviewed included EPA staff at the PIU, Head Office and in the project area- Bole,
iii. **Telephone Interviews:** Some of the stakeholders were able to comment on the proposed project by means of telephone conversation e.g., the coordinator of the community mining project at Tinga.

4.4 Stakeholder Identification and Engagements Activities

The Consultants identified the relevant stakeholders mostly the institutions and miners to gauge their levels of interest as well as their concern for the environment and any social considerations. We had used mainly formal/ informal discussions with individuals representing the institutions consulted. We had used Key Person Interviews (KPI), meetings of miners, Focus Group Discussions (FGD) in the consultation process. In addition, formal correspondences with other stakeholders were used.

The groups consulted include among others officials of:
- Bole District Assembly;
- Tinga Community Mining Committee;
- he Miners at Tinga;
- Youth Representatives at Tinga;
- Women In Mining at Tinga;
- Local Mining Investors in Tinga;
- Partners in Participatory Development, Non-Governmental Organization (NGO) operating in the Savannah Region/ Bole District; and
- Environmental Protection Agency (EPA)- Head Office, Accra.

It is significant to note that not all the stakeholders consulted:
- provided comments on the proposed project;
- completed a stakeholder engagement form provided;
- could sign the stakeholder engagement form provided; and
- could be captured photographically.

4.5 Stakeholder Analysis and Prioritization

The stakeholders are grouped according to their roles, interests and influence on the project, as well as to the extent to which they will be negatively or positively impacted by the proposed project. The degree to which the identified stakeholders will be impacted by the project and the level of influence of the stakeholders on the project outcome are rated as *low, medium or high* as defined hereunder.

Degree of Project Impact on Stakeholders
The impact of the project on the stakeholder is the extent of benefits or losses/ damages that the affected stakeholder will gain/ suffer due to project implementation, and are categorized as low, medium and high as provided below.

***Low*:** The project is assessed to have an insignificant (positive or negative) impact on the stakeholder.

Medium: The project will have measurable (positive or negative) impact on the stakeholder.

High: The project will have a significant (positive or negative) impact on the stakeholder.

Degree of Stakeholder Influence on Project Outcome
The degree of stakeholder influence on project outcome is the extent, ability or capacity of the stakeholder to positively influence project outcome (i.e., promote, facilitate or enable project implementation etc.) or negatively influence project outcome (i.e., delay, halt, prevent project implementation etc.).

Low: The stakeholder has minimal capability to positively or negatively influence the outcome of the project.

Medium: The stakeholder has measurable capability to positively or negatively influence the outcome of the project.

High: The stakeholder has significant capability to positively or negatively influence the outcome of the project.

The frequency of engagement and management of these stakeholder groups will then depend upon the level of priority placed on them. High priority stakeholders should be properly or carefully managed, engaged more often during project development and implementation than moderate and low priority stakeholders. **Table 4-1** describes the criteria for determining priority

levels and **Table 4-2** provides the stakeholder analysis in more detail as far as the establishment of the Tinga CMDC is concerned.

Table 4-1: Criteria for Determining Level of Priority

		Extent of Project impact on stakeholder		
		Low	**Medium**	**High**
Level of influence of stakeholder	**Low**	*Low priority*	*Moderate priority*	*High priority*
	Medium	*Moderate priority*	*Moderate priority*	*High priority*
	High	*High priority*	*High priority*	*High priority*

4.6 Stakeholder Engagement Strategy

4.6.1 Guiding Principles of the Stakeholder Engagement Strategy

The stakeholder engagement strategy for the proposed project is in accordance with the requirements of WBG's basic principles of good practice in stakeholder consultation, which states that a good consultation process should be:

- Targeted at those most likely to be affected by the project;
- Early enough to scope key issues and have an effect on the project decisions to which they relate;
- Informed as a result of relevant information being disseminated in advance;
- Meaningful to those consulted because the content is presented in a readily understandable format and the techniques used are culturally appropriate;
- Two-way so that both sides have the opportunity to exchange views and information, to listen, and to have their issues addressed;
- Gender-inclusive through awareness that men and women often have differing views and needs;
- Localized to reflect appropriate timeframes, context, and local languages;
- Free from manipulation or coercion;
- Documented to keep track of who has been consulted and the key issues raised;
- Reported back in a timely way to those consulted, with clarification of next steps; and
- Ongoing as required during the life of the project.

4.6.2 Engagement Strategy and Approach

The stakeholder engagement process begins at the preliminary stages during, which this ESMP for the proposed project has been prepared, and would continue through to ESMP submission to EPA for permit and during project implementation. **Table 4-3** summarizes the proposed approach for stakeholder engagement.

Table 4-2: Stakeholder Identification and Analysis

No.	Groups of Stakeholders	Stakeholder(s)	Role of Stakeholder/ Relation to the Project	Degree of Project Impact on Stakeholder	Level of influence on Project Outcome	Level of Priority
1.	Project Proponents and Partners	EPA- PIU	❍ Accountable entities responsible for successful implementation of the project including design, construction and operation of the CMDC at Tinga	High	High	High
2.	Regulatory Agencies	EPA	❍ The Agency will issue a permit for the construction and operation of the facility and will monitor the project to ensure compliance to the permit conditions and adherence to the Environmental Assessment Regulations, 1999 (LI 1652).	High	High	High
		Ghana National Fire Service (GNFS)	❍ To provide fire permit /certificate for the CMDC at Tinga and any work camp to be established by the contractor	Medium	Medium	Moderate
		Mines Inspectorate Division (MID) of the Minerals Commission (MC)	❍ To provide Mining Services Operating Permits for the CMDC at Tinga and other service providers during construction and operations of the project	Medium	Medium	Moderate
3	Relevant Government Agencies/ Institutions	Lands Commission (LC)	❍ Will assist the PIU for registration of the land for the Tinga CMDC	Medium	Medium	Moderate
4	Right of Way Users/Utility Companies	Northern Electricity Distribution Company (NEDCo)	❍ Will assist the PIU to extend power to the Tinga CMDC	Medium	Medium	Moderate
5	Administrative/Local Government Authorities	The District Assembly	❍ The proposed sub project is within the jurisdiction of the Bole District. ❍ The District is responsible for the political administration and issuance of development permits. Will provide business registration license for the Contractor to operate in that MMDA. ❍ The Bole District Assembly will provide development permit for the CMDC at Tinga during construction and a Business Operating Permit (BOP) during its operations ❍ Will be involved with grievance resolutions	High	Medium	High
6	Traditional Authorities and local communities	Traditional Councils or relevant stools (Paramount chiefs/ community chiefs and elders)	❍ Traditional Councils in the MMDAs/ Towns are the original traditional landowners and have traditional/ cultural oversight of local communities.	Medium	High	High

No.	Groups of Stakeholders	Stakeholder(s)	Role of Stakeholder/ Relation to the Project	Degree of Project Impact on Stakeholder	Level of influence on Project Outcome	Level of Priority
			❍ Traditional Councils facilitates development and resolution of conflicts/ disputes among community members.			
		Local communities	❍ Local people may not get access to the land to be used for the Tinga CMDC and restrict them from accessing any ecosystem services the land and its resources may offer them.	High	Medium	High
7	NGOs/ CBOs	NGOs	❍ Support to EPA to ensure implementation of the Tinga CMDC.	Medium	High	High
		Mass media	❍ Responsible for information dissemination, communication and education of the general public and local communities through electronic and print media	Medium	High	High
		General public/ citizenry	❍ People interested in the Tinga CMDC	Medium	Medium	Moderate
			❍ The portion of the public that will be affected by the proposed project	High	Medium	High
			❍ The portion of the public that will benefit from the Tinga CMDC	Medium	Medium	Moderate

Table 4-3: Stakeholder Engagement Strategy/ Plan for the Project

No.	Activity	Identified Stakeholder(s) Groups	Focus of Consultation/ Information to be shared and or discussed	Timelines/ Frequency	Forms of communication/ method of engagement	Facilitator/ Responsibility
1.	Consultations for the preparation of ESMP for the proposed Tinga CMDC	❍ Environmental Protection Agency (EPA) ❍ LVD of Lands Commission ❍ Project affected persons/ institutions ❍ Bole District Assembly ❍ Selected opinion leaders from Tinga ❍ Selected NGOs	❍ Potential environmental and social issues of concern from the proposed Tinga CMDC implementation ❍ Compliance with EPA and WB requirements ❍ Suggestions for mitigating the potential adverse impacts and successful maintenance of the project facilities during operation ❍ Public and occupational health and safety at construction sites	During the ESMP study period	❍ One on one Interviews ❍ Focus group discussions (FGD) ❍ Field visitations ❍ Sharing and review of relevant reports ❍ Email and phone calls	ESMP Consultant
2.	Draft ESMP Consultations and Disclosure	❍ Opinion Leaders from Tinga ❍ Project Affected Persons (PAPs)	❍ Feedback on issues and concerns raised during the ESMP preparation ❍ Changes in the project designs	After Submission of draft ESMP to EPA- PIU	❍ Draft ESMP notification in a national daily newspaper	ESMP Consultant EPA- PIU

No.	Activity	Identified Stakeholder(s) Groups	Focus of Consultation/ Information to be shared and or discussed	Timelines/ Frequency	Forms of communication/ method of engagement	Facilitator/ Responsibility
		❍ Key institutional stakeholders engaged during the preparation of the ESMP ❍ Bole District Assembly and traditional authorities	❍ Presentations on findings from the ESMP study including proposed mitigation measures, grievance redress arrangements ❍ Receiving of comments from participants and potentially affected people and responding to comments.		❍ Public engagement forum	
3.	Disclosure of the final ESMP.	❍ Bole District Assembly ❍ Relevant Regulatory Bodies ❍ Traditional authorities/ councils ❍ Mass Media ❍ Selected NGOs	❍ Make available copies of the approved ESMP	After Issuance of the environmental permit for the Project by EPA	❍ Publication of the approved ESMP to inform the public where they can access the document ❍ Deliver hard and/or soft copy of the approved ESMP to relevant stakeholders	ESMP Consultant EPA- PIU
4.	Pre – mobilization/ Site preparation prior to construction	❍ Bole District Assembly ❍ Relevant Regulatory bodies including MID of MC and GNFS ❍ Utility companies e.g., NEDCo ❍ PAPs ❍ Traditional authorities/ local communities ❍ Selected NGOs	❍ Information on schedule of preparation and construction works ❍ Awareness creation on the potential impacts and remedial measures to PAPs/ I&APs) ❍ Integration of the ESMP into planning for construction (impacts and mitigation measures) ❍ Grievance redress procedures	At least 2- 3 months prior to construction	❍ Sharing of relevant reports ❍ Institutional / PAPs notifications via mass media.	EPA- PIU
5.	Start of construction	❍ Bole District Assembly ❍ Relevant Regulatory bodies including MID of MC and GNFS ❍ Utility companies e.g., NEDCo ❍ PAPs ❍ Traditional authorities/ local communities ❍ Selected NGOs ❍ Contractor	❍ Information on Schedule of construction works, activities and progress of construction ❍ Awareness creation on the potential impacts and mitigation measures ❍ Sensitization on ESMP Implementation (impacts and mitigation measures) ❍ Code of Conduct for Contractor ❍ Grievance redress mechanism	Throughout the construction period	❍ General stakeholder meetings for Consultants and Contractor ❍ Notification and sensitization via mass media.	EPA- PIU
6.	End of construction /	❍ Bole District Assembly	❍ Information on Schedule of decommissioning works, activities and progress of decommissioning	Decommissioning phase	❍ General stakeholder	EPA- PIU

No.	Activity	Identified Stakeholder(s) Groups	Focus of Consultation/ Information to be shared and or discussed	Timelines/ Frequency	Forms of communication/ method of engagement	Facilitator/ Responsibility
	Decommissioning of construction equipment and machinery	❍ Relevant Regulatory bodies including MID of MC and GNFS ❍ Utility companies e.g., NEDCo ❍ PAPs ❍ Traditional authorities/ local communities ❍ Selected NGOs ❍ Contractor	❍ Awareness creation on the potential impacts and mitigation measures to stakeholders ❍ Grievance redress mechanism		meetings for Contractor and EPA- PIU ❍ Community/ ❍ Institutional notification and sensitization via mass media.	
7.	Commissioning and handing over	❍ Bole District Assembly ❍ Relevant Regulatory bodies including MID of MC and GNFS ❍ Utility companies e.g., NEDCo ❍ PAPs ❍ Traditional authorities/ local communities ❍ Selected NGOs	❍ Relevance of the project ❍ Roles and responsibilities during operation and maintenance (O&M)	Commissioning	❍ Public durbar / meeting	EPA- PIU

4.7 Stakeholder Engagements Held, Issues or Concerns Raised and Information Received

A number of public stakeholders have been consulted for the establishment of the CMDC at Tinga. As much as possible, the community/ opinion leaders, EPA officials and officials of the Bole District Assembly were interviewed/ consulted. The list of stakeholders consulted include the following listed hereunder and the issues discussed have been summarized in **Table 4-4**. **Plate 4-1** show consultations with the Community Mining Leaders and Miners at Tinga among others.

The detailed consultation outcome with names, contact of persons engaged, designation etc. has been provided in **Annex 4-1**.

Table 4-4: Summary of Stakeholder Consultations

No.	Groups of stakeholders	Stakeholder(s)	Summary of Consultation Outcomes
1.	Project Proponents and Partners	AEHPMP PIU	❍ Expect to use the ESMPs as basis for acquiring Environmental Permits for the projects.
2.	Regulatory Agencies	Environmental Protection Agency (EPA)	❍ Need for the project to be registered with the agency in compliance with Act 490 and LI652
3 3	Relevant Government Agencies/ Institutions	Bole District Assembly	❍ Settlement structure of the district is Semi-Clustered. ❍ The settlements vary in size and type-range from hamlets to urban settlements. ❍ There are six urban communities with population above 5,000 which are classified as first level settlements. These are Bole, Bamboi, Tinga, Banda Nkwanta and Jama. The second level settlements are Mankuma, Maluwe, Mandari, Teslima and carpenter with populations of 2,000 and above but not up to 5,000. The rest are rural communities and hamlets. ❍ The rural communities are basically bases of primary economic activities, whereas the urban settlements derive their life support from processing of agric produce, serve as marketing centers and provide other support services. ❍ Major problems are non-adherence to planning regulations, encroachment on government lands and open spaces, non-enforcement of byelaws and unavailability of settlement plans and layouts. Open defecation is also a threat to healthy living in the communities. ❍ Aware of the project and expressed optimism about its success in addressing the mercury menace in mining in the district. ❍ Assured the readiness of the district to cooperate and assist in any way the assembly could. ❍ Would like to know what becomes of the miners who derive their livelihood from mining in the Tinga community especially the women who do some sort of primary crushing at the various sites.
		Ghana Education Service (GES), Bole	❍ Not only are the education facilities not well distributed, some of the structures are but run down. A number of primary school buildings in the District are three unit classroom blocks. This necessitates

No.	Groups of stakeholders	Stakeholder(s)	Summary of Consultation Outcomes
			the holding of multi-grade classes which affects quality of teaching and learning. ❍ This state of affairs has two implications: firstly, pupils from communities without JHSs have to travel longer distances to other communities with JHSs and for a considerable number of them, it marks the end of their education; secondly, JHSs will be overcrowded since they serve many primary schools.. ❍ The school buildings needs to be renovated to make learning attractive to children of school going age and deter them from galamsey.
		Directorate of Agriculture, Ministry of Food and Agriculture (MoFA), Bole	❍ Farmers will only produce beyond subsistence when their produce are assured of good market. Lack of access to markets and storage facilities can lead to post-harvest losses as far as perishable produce are concern. ❍ The markets in the district are few and far apart. This increases transportation cost to and from the market and hence the cost of items in general. ❍ Extension delivery to farmers is limited because of the few numbers of the Agriculture Extension Agents (AEAs) attending to several farmers. The number of AEAs required to deliver efficient and effective extension service is in sharp contrast to the number at post. ❍ Though officers are few, most farmers had their fields and homes visited for extension delivery. ❍ Environmental management is essential to sustain continuous farming. AEAs and farmers were trained on safety use of chemicals. ❍ Does not seem to have any knowledge of establishing the Tinga CMDC and expressed concern about most farmers diverting into mining due to the continuous low crop yields. ❍ Expressed optimism that the project will take off soon and become beneficial to the community and the people of the Bole District in general.
4	Interested and Affected Parties (I&APs)	Mine Owners	❍ The Tinga Wenchi-Wenchi community mine is an artisanal underground mine that mines hard rock deposit. ❍ This process requires drilling of holes in the rock and feeding these holes with explosives. ❍ The charged rocks are then exploded and the gold ore deposits are conveyed to the surface by men, known as “loco boys” for onward processing. ❍ The profitability of the operation to a large extent depended on their geographical knowledge of the ore bearing rocks. ❍ A lot of miners have contracted respiratory disease conditions from the mining site, hence cough is prevalent. ❍ Suggested that security should be beefed up by introducing police visibility at the mining and equipping the police with the requisite logistics.

No.	Groups of stakeholders	Stakeholder(s)	Summary of Consultation Outcomes
			❍ Advised that local people should be trained to operate the center in order to ensure success of the project. ❍ Would like to know what happens to the owners of CHANG FA crushers and their operators since they will be out of business.
		Women in Mining	❍ Women undertake some of the most critical aspects of the production chain yet they are among the least paid. ❍ Complaint about exploitation by buyers and their male counterparts, which stems from the fact that they are not educated enough to be able to benefit fully from the mining venture. Their lack of knowledge about effective mining techniques leads to lost earnings. ❍ Since most of the women are burdened with the responsibility of fending for their children, they tend to accept any offer, further impoverishing them. ❍ A few of the women noted that they were engaged in other economic activities before venturing into mining. ❍ They indicated that mining seems to be the most lucrative venture under the current circumstances. 90% of the women depend solely on mining for their livelihood. ❍ They also have insufficient social protection mechanisms to financially safeguard themselves and their families. ❍ They admit that they are not well organized or mobilized in a group ❍ They complained about the lack of childcare and sanitation facilities at the Wenchi-Wenchi site ❍ They admit working with mercury which exposes them to substantial health risk; they sometimes keep the mercury at home and this endangers the health of their families and their community. ❍ Would like to know if the demonstration center will charge them for the milling lode. ❍ Suggests that security needs to be improved at the site to prevent stealing of wares. ❍ They requested for proper places of convenience to be constructed for them to help with the hygiene of the Wenchi-Wenchi site
		Mining Committee	❍ The Minerals Commission should consider opening an office in the area to facilitate speedy processing of documents required by prospective miners, instead of doing everything in Accra, the capital city. ❍ Enquired whether the new extraction method being proposed can extract more gold than using mercury. ❍ Similar projects have failed in the past; implementers of this project should eschew all forms of cronyism and favoritism to ensure that the project succeeds.

No.	Groups of stakeholders	Stakeholder(s)	Summary of Consultation Outcomes
7	NGOs/ CBOs	Partners in Participatory Development	❍ The NGO was established some 25 years ago. The organization is into advocacy of girl child education, reproductive health issues and environmental sustainability. ❍ Applauds the importance of such a program and underscored its importance at such a crucial time when environmental degradation is being attributed to mining. ❍ That the use of mercury is pervasive as a result of ignorance of its very toxic nature and the unavailability of an alternative to mercury. ❍ That with intensive sensitization and education, the miners will come to terms with the harmful attributes of mercury. ❍ That an alternative must be made easily accessible so as to forestall the use of mercury. ❍ Ensure the project implementation meets local and international standards

The following are highlights of the key issues/concerns raised by stakeholders/ I&APs during the consultations:

- Concerns were raised by the directorate of agriculture about possible food shortages as more people are venturing into mining coupled with the low rainfall events in recent times.
- Need for improved sanitation at the Wenchi-Wenchi mine site.
- Need to ensure police presence at the Wechi-Wenchi mine site to improve the security at the mine site
- Need for provide a health care facility for the miners since the mine is far removed from the Tinga town.
- The miners expressed concern about whether the CMDC will be able to process all the ore mined at Wenchi-Wenchi in Tinga.
- The executive of the Tinga Community Mine requires support in extending electricity to the site to ensure increased production of the gold ore.
- Some community members/ miners had doubts that the project will see the light of day or may be diverted to another place.
- Aside the CMDC to be established, miners also require implements such as water pumps, PPEs at the mine shafts to be able to increase ore production and to ensure their safety.
- The miners are aware of the mercury problem are eager to support the project at Tinga to succeed.

Adequate responses to the consultees were provided by the Consultant as much as possible.

<u>Social Acceptability of Project</u>

The people at Tinga and environs are generally receptive and open for discussion on the need to eliminate mercury in their mining operations. All stakeholders from both government agencies and local groupings and community leaders the consulting team interacted with showed strong need for improvement of their mining and gold processing needs and are very willing to work and cooperate with the PIU to implement the proposed interventions. They are therefore prepared to make concessions and sacrifices that may be necessary during the project construction and operation.

(a) Meeting with Community Mining Leaders

Plate 4-1:Consultation with Community Mining Leaders, Women and Miners at Tinga

5.0 ASSESSMENT OF POTENTIAL ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS, AND ALTERNATIVE ANALYSIS

This chapter presents environmental and social risks and impacts that are likely to result from the implementation of the Tinga CMDC as a result of the interaction between the project components and the environmental and social elements. The method employed for the impacts and risk assessment/ evaluation has also been provided under this chapter.

Overall, the preconstruction, construction, operation and decommissioning phases of the proposed project at Tinga may result in a number of potential environmental and social impacts and risks. These potential impacts could be positive, negative or neutral for which the adverse ones should be mitigated, and the positive ones enhanced and forms part of this ESMP.

5.1 Specific Project Activities of Environmental and Social Concern

The project activities and interventions are grouped into four phases where there are potential for environmental and social impacts and risks. The phases are as follows:

- Pre-construction Phase;
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

5.1.1 Preconstruction Phase

The activities to be carried out at the preparatory or pre-construction phase prior to the implementation of the proposed project include:

- Clearing of the Tinga project site (0.38Ha) including site preparation, collection and disposal of vegetal wastes to make way for the actual construction and related activities;
- Mobilization of construction materials and equipment to the construction site;
- Continued stakeholder engagement and sensitization activities;
- Acquisition of statutory permits e.g., Environmental Permit from EPA, Developmental Permit from Bole District Assembly and ting activities; and
- Pegging the exact boundaries of the project construction activities; and
- Installation of appropriate safety signage at appropriate sections of the works area and at other vantage points.

5.1.2 Constructional Phase Activities

The major constructional phase activities to potentially impact on the biophysical and social environments include the following among others:

- Removal of tree stumps and further clearing of the project site;
- Excavation and civil works for the foundation of the CMDC structure and facilities;
- Haulage of construction materials to the project site; and
- Collection, transportation, and disposal of construction waste- i.e., vegetal waste and spoil.

5.1.3 Operational Phase Activities

The operational activities that have potential to result in environmental and social impacts include the following:

- Handling and disposal of wastewater/ effluent in accordance with the applicable Ghana Standards for the Gold Mining Sector- Quarry and Mining Industry;
- Dust
- Facility Maintenance and repair works;
- Insects/ Pest management e.g., tsetse fly and termites;
- Materials management and storage;
- Occupational Health and Safety (OHS);
- Provision of security services; and
- Solid waste management including hazardous waste

5.1.4 Decommissioning Phase

The main decommissioning phase activities to potentially impact on the environment consist of the following:

- Post-construction activities including the demobilisation of construction equipment, dismantling of construction site offices/ work camps, etc., and
- Post operational activities including abandoning or removal of the Tinga CMDC.

Decommissioning of the Tinga CMDC following the expiration of its design life or for massive improvements may impact on public and occupational health and safety, noise and air quality.

5.2 Impact Assessment/ Evaluation Approach

5.2.1 Impact Identification and Characterization

Impacts are described in terms of their characteristics, including the impact's type and the impact's spatial and temporal features (extent, duration, scale and frequency). The definitions of the terms used are described in **Table 5-1.**

Table 5-1: Impact Characteristics

	Definition	Terms
Type	A descriptor indicating the relationship of the impact to the project (in terms of cause and effect).	**Direct** - Impacts that result from a direct interaction between the project and a resource/receptor (e.g., between occupation of a plot of land and the habitats that are affected). **Indirect** - Impacts that follow on from the direct interactions between the project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the project occupying a plot of land). **Induced** - Impacts that result from other activities (which are not part of the project) that happen because of the project. **Cumulative** - Impacts that arise because of an impact and effect from the project interacting with those from another activity to create an additional impact and effect.
Duration	The time period over which a resource/ receptor is affected.	**Temporary** - (period within 1 year -negligible/associated with the notion of reversibility) **Short term** - (period of up to 3 years i.e., construction period or production ramp up period) **Medium term** -(period of more than 3 years to 10 years) **Long term** - (period of more than 10 years and less than 20 years i.e., life of facility) **Permanent** - (a period that exceeds the life of the facility – i.e., irreversible. Or may last for a very long time)
Extent	The reach of the impact (i.e., physical distance an impact will extend to)	**On-site** - impacts that are limited to the project site. **Local** - impacts that are limited to the project site and adjacent properties. **Regional** - impacts that are experienced at a regional scale, i.e., beyond adjacent properties, covering the district and beyond **National** - impacts that are experienced at a national scale. **Trans-boundary/International** - impacts that are experienced outside of Ghana
Scale	Quantitative measure of the impact (e.g., the size of the area damaged or impacted; the fraction of a resource that is lost or affected, etc.). or the professional viewpoint of the measure of impact	Quantitative measures as applicable for the feature or resources affect/ professional viewpoint of expert as applicable for the feature or resource in terms of severity of impact measure (i.e., minor, moderate, severe)
Frequency	Measure of the constancy or periodicity of the impact.	No fixed designations; intended to be a numerical value or a qualitative description, e.g., intermittent, once, daily, annually, continuous etc.

	Definition	Terms
Likelihood	Characteristic that pertains to unplanned events determined either qualitatively or quantitatively estimated on the basis of experience and/or evidence that such an outcome has previously occurred.	**Unlikely** – The event is unlikely but may occur at some time during normal operating conditions. **Possible** – The event is likely to occur at some time during normal operating conditions. **Likely** - The event will occur during normal operating conditions (i.e., it is essentially inevitable).

5.2.2 Determining Impact Magnitude

Once an impact's characteristics are defined, the next step in the impact assessment phase was to assign each impact a 'magnitude'. Magnitude is typically a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- Extent;
- Duration;
- Scale; and
- Frequency.

Magnitude (from small to large) is in practice a continuum, and evaluation along the spectrum, requires the exercise of professional judgment and experience. Each impact was evaluated on a case-by-case basis, and the rationale for each determination noted. The universal magnitude designations, for negative effects, are: negligible, small, medium and large. The magnitude designations themselves are universally consistent, but the definition for the designations varies by issue.

5.2.3 Determining Receptor Sensitivity

The other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. There are a range of factors taken into account when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. The sensitivity of receptor used is low, medium and high as shown in **Table 5-2**.

Table 5-2: Sensitivity Criteria

Value / Sensitivity	Low	Medium	High
Biological and Species Value / Sensitivity Criteria			
Criteria	Not protected or listed as common/ abundant; or not critical to other ecosystem functions (e.g., key prey species to other species).	Not protected or listed but may be a species common globally but rare in Ghana with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline.	Specifically protected under Ghana legislation and/or international conventions e.g., CITES listed as rare, threatened or endangered e.g., IUCN
Socio-Economic Sensitivity Criteria			
Criteria	Those affected are able to adapt with relative ease and maintain pre-impact status.	Able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.	Those affected will not be able to adapt to changes and continue to maintain-pre-impact status.
Physical Sensitivity Criteria			
Criteria	The resource remains unaffected and maintains pre-impact status.	Pre-impact status is temporarily altered. May be restored over time naturally or through specific interventions.	Pre-impact status is permanently altered by the development. Receptor or resource is held in high-esteem by stakeholders

5.2.4 Assessing Significance

Once magnitude of impact and sensitivity of a receptor have been characterised, the significance can be determined for each impact. The impact significance rating was determined, using the matrix provided in **Table 5-3.** The definitions or explanations of the impact significance assessment rating is provided in **Table 5-4.**

Table 5-3: Impact Significance Rating Matrix

		Sensitivity / Vulnerablity of Resource / Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Table 5-4: Definition of the Impact Significance Assessment Rating

Rating	Impacts
Negligible	○ Impacts that are hardly distinguishable from background conditions and expected development in a no-project situation ○ Impacts very unlikely to happen
Minor	○ Impacts of low intensity, limited in scale (site-specific) and low/medium duration (temporary) ○ Impacts unlikely to happen and/or the sensitivity of the receiving environment is very low and/ or project designs have installed sufficient control mechanisms ○ impacts can be mitigated and minimized to a negligible level through the adoption of good practice, continuous improvement and optimization measures
Moderate	○ adverse impacts on people and/or environment of medium intensity, which may have a regional spatial scale of influence or a long-term duration ○ impacts that are measurable and able to change some characteristics of the receptor/ resource, but not to generate irreversible, unprecedented or multiple adverse effects or damage ○ impacts can be avoided, managed and/or mitigated with relatively uncomplicated accepted measures
Major	○ significant adverse impacts on human populations and/or environment, high in intensity and/or spatial extent (e.g. large geographic area, large number of people, transboundary impacts, cumulative impacts) ○ permanent and/or irreversible impact ○ areas impacted include areas of high value and sensitivity (e.g. valuable ecosystems, critical habitats) ○ impacts may give rise to significant social conflict ○ impacts may not always be reduced by implementing mitigation measures. In this case, further options have to be considered in order to avoid any critical significance driven by the project (analysis of alternative strategy). Therefore, significant resources or fundamental changes in the activities and systems are required where necessary.

5.3 Identification of Potential Environmental and Social Impacts

Identified potential environmental and social impacts are outlined under the four main phases of the project activities; preconstruction, construction, operation and decommissioning phases.

5.3.1 Potential Positive Environmental and Social Impacts for the Pre-construction Phase

The positive impacts from the preparatory phase activities include:

- Awareness on impacts and risks of mercury use in ASGM in Tinga;
- Employment and business opportunities in ASGM in Tinga;
- Improvement in local economy; and

- Improved institutional revenue.

The positive impact assessment for the pre-construction phase is summarised in Table 5-5.

5.3.2 Positive Environmental and Social Impacts of Construction Phase

The potential positive impacts from the construction phase activities include:

- Construction health and safety education and awareness in Tinga;
- Employment opportunities;
- Improvement in local economy;
- Improved Institutional coordination in the mining sector; and
- Increase in institutional and national revenue.

The positive impact assessment for the construction phase is summarised in Table 5-6.

5.3.3 Positive Operational Phase Environmental and Social Impacts

The positive impacts or benefits from the operational phase activities include but not limited to the following:

- Enhanced Image of Tinga as a model mercury free mining community;
- Improved health of miners and community members;
- Employment of some community members at the CMDC at Tinga; and
- Improvement in local and national economy.

The positive impact assessment for the operational and maintenance phase is summarized in Table 5-7.

Table 5-5: Positive Impacts and Risks Assessment Matrix for the Pre-Construction Phase

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
Environment and Social											
Awareness on impacts and risks of mercury use in ASGM in Tinga	The consultation process will create awareness on the risks and impacts in ASGM on the Tinga CMDC	Direct	Long-term	Local	Once	Likely	Moderate	Medium	Stakeholders	Medium	Moderate
Employment and business opportunities in ASGM in Tinga	Some local consultancy companies as well as individual Ghanaian specialists will be contracted to carry out various studies/surveys (e.g. topographic surveys, geotechnical investigations, architectural and engineering designs, ESIA study etc) and these will create jobs for local firms or Ghanaian individuals.	Direct	Long-term	National	Once	Likely	Moderate	Medium	Local Firms involved in the project	Medium	Moderate
Improvement in local economy	The hospitality industry as well as the car rental service providers will also benefit, which will improve their businesses.	Direct	Long-term	Local	Once	Likely	Moderate	Medium	Bole District	Medium	Moderate
Improved institutional revenue	The various regulatory bodies will charge processing and permit fees (e.g., EPA, Lands Commission, GNFS, Municipal Assemblies etc) in providing approvals or permits for project facilities and implementation. These fees will improve the revenue base of these institutions.	Indirect	Long-term	National	Once	Likely	Moderate	Medium	Institutions involved in the project	Medium	Moderate

Table 5-6: Positive Impacts and Risks Assessment Matrix for the Construction Phase

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
Environment and Social											
Construction health and safety education and awareness in Tinga	The construction workers will gain knowledge from the project on construction health and safety through awareness creation workshops/ talks	Direct	Long-term	Local	Once	Likely	Moderate	Medium	Stakeholders	Medium	Moderate
Employment and business opportunities	The contractor will employ some local labor for the works	Direct	Long-term	National	Once	Likely	Moderate	Medium	Local Firms involved in the project	Medium	Moderate
Improvement in local economy	The contractor will be encouraged to purchase some materials from the local market to shorten the supply time and reduce cost of materials such as sand, aggregates, stones, rocks, cement, fuel, water and spare parts of equipment. Local individuals/traders will also bring their goods and food items near construction sites to sell and this will generate income for the local people.	Direct	Long-term	Local	Once	Likely	Moderate	Medium	Bole District	Medium	Moderate
Improved Institutional Coordination in the Mining Sector	The coordination between institutions in the mining sector e.g., EPA, Minerals Commission, and those responsible for contractor registration etc is expected to improve	Direct	Long-term	National	Once	Likely	Moderate	Medium	Bole District	Medium	Moderate
Improved institutional revenue	Revenue will accrue to the State in the form of tax deductions from wages of workers and Contractor fees.	Indirect	Long-term	National	Once	Likely	Moderate	Medium	Institutions involved in the project	Medium	Moderate

Table 5-7: Positive Impacts and Risks Assessment Matrix for the Operation and Maintenance Phase

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
Environment and Social											
Enhanced Image of the Tinga as a model mercury free mining area	The activities of the CMDC at Tinga will enhance the image of the community as a mercury free mining area as other small scale miners will embrace the mercury free technology in their operations	Direct	Long-term	Local	Once	Likely	Moderate	Medium	Stakeholders	Medium	Moderate

Improved health of miners and community members	The miners who hitherto uses mercury in their operations will avoid any health impact from mercury usage	Direct	Long-term	National	Once	Likely	Moderate	Medium	Local Firms involved in the project	Medium	Moderate
Employment of some community members at the CMDC at Tinga	Some community members in the Tinga community will gain employment at the Tinga CMDC	Direct	Long-term	Local	Once	Likely	Moderate	Medium	Bole District	Medium	Moderate
Improvement in local and national economy	Revenue will accrue to the State in the form of tax deductions from wages of workers of the Tinga CMDC.	Indirect	Long-term	National	Once	Likely	Moderate	Medium	Institutions involved in the project	Medium	Moderate

5.4 Potential Negative/Adverse Environmental and Social Impact Evaluation

The potential negative/adverse impact evaluations for the preparatory/pre-construction, construction, operational and decommissioning phases of project implementation are assessed in **Tables 5-8, 5-9 and 5-10.**

Table 5-8: Adverse Impacts and Risks Assessment Matrix for the Pre-Construction Phase

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
Environment and Social											
Preconstruction Waste Generation and Management	Site preparation for construction to start	Direct	Short-term	Local	Once	Possible	Moderate	Medium	Technical and Consulting Teams	Medium	Moderate
Project Land take/ Ease of Access to Project Land	The Tinga CMDC is a 0.94 acre (0.38Ha) site and restricted to only one location on the site. The land is currently unoccupied	Direct	Long-term	Local	Once	Likely	Moderate	Medium	Users of the land	Medium	Moderate
Anxiety on the part of Miners, Institutions and Users of the Tinga CMDC	Lack of awareness and anxiety on the part of Miners, Institutions and Potential Users of the Tinga CMDC as preconstruction activities e.g., surveys, assessments, stakeholder engagements etc. are ongoing	Indirect	Short-term	Regional	Intermittent	Possible	Moderate	Medium	Landowners/ Tinga Community	Medium	Moderate
Risk of Not Acquiring all Permits	The project is funded by the World Bank, hence there should be a "No Objection" from the bank. The project is required to obtain an Environmental Permit for the project and also a developmental permit from the Bole District Assembly among others. However, the preparation of this ESMP is to provide the basis of obtaining the World Bank "No Objection" and also an Environmental Permit from EPA	Indirect	Short-term	National	Annually	Possible	Moderate	Medium	Contractor, World Bank, Government and People of Ghana	Medium	Moderate
Occupational Health and Safety Concerns/ Risks	Exposure of technical teams carrying out topographical, geotechnical, and environmental baseline surveys to stepping on sharp objects e.g., broken nails and bottles, and bites from insects and dangerous reptiles e.g., snakes, scorpions and insects e.g., tsetse flies, bees and ants is possible	Direct	Short-term	Regional	Intermittent	Possible	Moderate	Medium	Technical/ Consulting Teams	Medium	Moderate

Table 5-9: Adverse Impacts and Risks Assessment Matrix for the Construction Phase

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
Environment and Social											
Air Quality Deterioration	Emissions from machinery and vehicles is expected to deteriorate the air quality in the project area, which may affect the health of workers and the community members.	Direct	Short-term	Local	Intermittent	Likely	Moderate	Medium	Workers, Community Members	High	Major
Vibration and Noise Nuisance	Excavation, construction and installation works in general and transportation activities to and from the site will all create noise nuisance due to site preparation, transportation of materials/ equipment, piling, blowing of horns from vehicles/ equipment etc.	Direct	Short-term	Local	Intermittent	Likely	Moderate	Medium	Users of the land	High	Major
Loss of Vegetation and Effect on Flora and Fauna	The clearing, excavation and construction activities will destroy/displace limited habitats of fauna such as small mammals, rodents, reptiles, insects and nesting birds. No large mammals will be affected.	Direct	Temporary	Local	Once	Likely	Minor	Small	Flora and Fauna	Medium	Minor
Surface Water Pollution	The Chakpa river at Tinga is ephemeral and dry for most part of the year unless there is heavy rain event. The stream is circa 2km from the project site. There is however the potential for silt to be carried from the project site into the river channel during construction if works are carried out during rain events/ rainy season	Direct	Short-term	Local	Intermittent	Likely	Minor	Small	Chakpa River	Medium	Minor
Fire Outbreaks	The Tinga project area is in a climatic region where fire outbreaks occasionally occurs and more of a yearly phenomenon especially during the dry season. Leaving dried leaves	Direct	Short-term	Local	Once	Likely	Moderate	Medium	Flora and Fauna	Medium	Moderate

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
	and stumps of trees close to the site can engender fire outbreaks. Fire from nearby areas may also stray to the CMDC.										
Land degradation and effect on soil resources	Without adequate protection measures, during heavy rainfalls and windy occasions, soil erosion could occur on the excavated Tinga CMDC site for construction. Soil contamination will occur if spillages of fuel/oil occur from construction equipment during the works.	Direct	Temporary	Local	Intermittent	Likely	Moderate	Medium	Tinga CMDC site	Medium	Moderate
Waste Generation and Sanitation Concerns	Waste to be generated includes spoil or excavated material from the Tinga CMDC site, biomass from clearing activities within the site, general waste including food wastes, water and food packaging/ containers, waste from maintenance of equipment/machinery such as waste oils, scrap metals, concrete waste among others. The construction activities will lead to significant generation of solid waste. In addition to solid waste, the construction workers will also generate liquid waste/ wastewater in the form of urine and fecal matter. The generation and management of both solid and liquid waste during the construction period is of significant sanitation concern.	Direct	Temporary	Local	Daily	Likely	Moderate	Medium	Tinga CMDC Site and Waste Disposal Site at Tinga	Medium	Moderate
Visual Intrusion/ Attraction	Site preparation and civil works/ general construction activities, movement of materials and equipment/machines to and from the project site and the presence of vehicles, trucks, construction equipment, and workers will attract the attention of local residents. Heaps of excavated material, stockpiles of aggregates, sand and gravels, as well as the parking of construction machinery and trucks will intrude into the visual quality of the area	Direct	Temporary	Local	Once	Likely	Moderate	Medium	Miners, Tinga Community Members	Medium	Moderate
Labor Influx	Job seekers, mainly unskilled youth and some skilled persons will throng the Tinga CMDC Site to look for employment and may end up engaging in illicit behaviors in the communities as the character of these people may not be known.	Direct	Short Term	Local	Intermittent	Likely	Moderate	Medium	Tinga community	Medium	Moderate
Occupational Health and Safety and Labor Issues	Workers will be exposed to risks during construction works. The risks include hazards from operation of construction machinery/ equipment, transportation of construction materials, inhalation of dust and fumes, noise from machinery, accidents from falling objects, cuts, slips, fall from high heights etc. Unhygienic working conditions, discriminatory practices, engagement of child labor could bring about social and labor conflicts and may trigger labor rights concerns. Poor management of waste and improper housekeeping could significantly affect safety in the workplace. The improper handling of hazardous materials such as lubricants is also a health threat to workers. There is also risk of exposing the workers to dangerous reptiles such as snakes. However, construction workers will be provided with appropriate Personal Protective Equipment (PPE) such as hard boots, gloves, hard hats, etc. to wear to safeguard their health and safety during the works. Furthermore, the contractor will be required to prepare and implement a health and safety strategy for the works which	Direct	Short Term	Local	Daily	Likely	Moderate	Medium	Construction workers	High	Major

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
	will be enforced by the supervising consultant and the PIU										
Public/ Community Health, Safety and Security	The people of Tinga community will be exposed to dust, exhaust fumes and noise nuisance from the construction activities. Construction activities may result in the movement of workers, mainly able-bodied young men, to the Tinga area in search of job opportunities. The influx of these workers during the construction period may promote irresponsible sexual behavior which could lead to teenage pregnancies, HIV/AIDS and other STD infections and serve as a public health concern. The influx of labor into the Tinga community will be a security concern for the local people. Thieves may take advantage as job seekers to also come into the community to steal or rob residents and workers.	Direct	Short Term	Local	Intermittent	Likely	Moderate	Medium	Tinga community and the miners/ construction workers	High	Major
Traffic Impacts	Tinga is circa 60km from Bole on the Bole-Bamboi Road. The Tinga to the Main Pit Site road is a feeder road with no traffic congestions. However, some pressure will be put on the road during the construction phase	Direct	Short-term	Local	Intermittent	unlikely	Minor	Small	Road Users/ motorists and local residents	Medium	Minor
Impact on socioeconomic norms or taboos	Field investigations indicate that no shrine, cemeteries or sacred groves will be affected under this project. However, being a predominantly Muslim community that frowns on Christian congregation, it is possible for the contractor or the workers to break such norms, which may result in conflicts	Direct	Short-term	local	-	Possible	Low	medium	Tinga community	High	major
Emergency events such as fires and workplace accidents	Fires, personal and vehicular accidents can occur at the project sites. The project area is known to experience annual bush fire events during the dry season. Some flooding is known to have occurred at Tinga during heavy downpours or rains with rivers overflowing their banks. The use of construction machinery, presence of fuel, and misconduct of workers such as improper disposal of cigarette butts after smoking, or creating naked fire or burning at or near the construction sites can cause unfriendly fires. Vehicular accidents can occur during transport of materials to the project site and materials such as concrete or aggregates can spill causing delays in work schedule. Workplace and vehicular accidents can cause serious injurious to workers or medical emergencies for that matter.	Direct	Temporary	Local	Intermittent	Possible	Moderate	Medium	Workers, road users, miners	Medium	Moderate
Sexual Exploitation and Abuse (SEA)/ Sexual Harassment (SH) Risks	SEA/ SH pose significant risk especially for the project in a rural community. SEA involves the exploitation of vulnerable individuals through coercive or manipulative behaviors, leading to severe psychological and physical harm. In contrast, SH creates a hostile work environment through unwelcome advances or demeaning conduct, compromising the dignity and well-being of workers. These behaviors can undermine morale, cause emotional distress, and damage professional relationships, ultimately leading to decreased productivity and increased turnover. Additionally, failure to address SEA and SH can tarnish a project's reputation, lead to legal liabilities, and incur financial penalties. Addressing these risks is crucial to maintaining a safe and respectful	Direct	Short term	Local	Intermittent	Possible	Low	Small	Tinga community and construction workers	High	Moderate

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
	workplace environment and upholding ethical standards in construction projects of this nature.										

Table 5-10: Adverse Impacts and Risks Assessment for the Operation and Maintenance Phase

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
Environment and Social											
Emergency Events and Impacts on Businesses	The occurrence of natural disasters such as earthquakes/ tremors may be unlikely due to the location of Tinga. Although flooding may be a possibility but its occurrence may be unlikely due to the location of the CMDC. However, emergencies such as power failure, accidents spillages etc. may result is shutting down the center for some time which may impact the fortunes of other businesses that may be depending on it.	Direct	Long-term or permanent	local	Intermittent	Unlikely	Minimal	Small	miners	medium	Minor
Air Quality Deterioration	The baseline air quality assessment at the Tinga CMDC was below the permissible GS and WHO guideline values and expected to exceed the GS and WHO guideline values during the operation of the CMDC at Tinga	Direct	long-term	Local	Intermittent	Likely	Moderate	Medium	Users of the Tinga CMDC, workers	High	Major
Noise Nuisance	The operation of the Tinga CMDC will generate some noise, which is expected to be contained in the production area. Fenceline noise is therefore expected to be below the GS value of 60dB(A) for a mixed use area. Higher noise from other operations may be intermittent and short lived	Direct	temporary	Local	Intermittent	Likely	Moderate	medium	Tinga community/ residents, workers	Medium	Moderate
Waste Generation	There is possibility of inappropriate management of waste from the Tinga CMDC. Inappropriate disposal of the wastes will result in insanitary conditions at the center. Maintenance and repair works, and office duties will also generate wastes that must be disposed of appropriately. Furthermore, improper handling of waste water can lead to the infection of water sources, soil and human health.	Direct	Short-term	local	Daily	Likely	Moderate	Medium	Tinga CMDC and surroundings	High	Major
Fire Outbreaks	The Tinga project area is in a climatic region where fire outbreaks occasionally occurs and more of a yearly phenomenon especially during the dry season. During the operation and maintenance phase of the Tinga CMDC, various fire risks could arise e.g., overheat from the smelting furnace, electrical fires from faulty wiring or overloaded circuits. There is potential for the center to be torched as a result of bush fires. Fire from nearby areas may also stray to the Tinga CMDC.	Direct	Short-term	Local	Intermittent	Likely	Moderate	Medium	Tinga CMDC	High	Major
Occupational Health and Safety Concerns	During the operation and maintenance phase of the Tinga CMDC, occupational health and safety issues can be substantial if not properly managed. Workers may face exposure to dust, noise and hazardous/ toxic substances if the right PPEs have not been supplied for	Direct	Temporary	Local	Intermittent	Likely	Moderate	Medium	Tinga CMDC site	Medium	Moderate

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
	use. Poor ergonomic conditions on the part of workers may result in pain.										
Labor Influx and conflicts with locals	During the operation and maintenance phase of the Tinga CMDC, job seekers may visit the center in search of non-existing jobs. This may create tension between them and the locals. Also, the labor influx could lead to increased demand for housing, services, and infrastructure in the close knit community	Direct	Temporary	Local	Intermittent	Likely	Moderate	Medium	Tinga community/ residents	Medium	Moderate
Community Health, Safety and Security	The Tinga CMDC when operational will provide job opportunities for some youth from outside the community exposing the community members to such youth. The influx of these workers during the operation and maintenance phase may promote irresponsible sexual behavior which could lead to teenage pregnancies, HIV/AIDS and other STD infections and serve as a public health concern. The influx of labor into the Tinga community will be a security concern for the local people. Thieves may take advantage as job seekers to also come into the community to steal or rob residents and workers.	Direct	Short Term	Local	Intermittent	Likely	Moderate	Medium	Tinga community and the miners/ construction workers	High	Major
Traffic Impacts	Tinga is circa 60km from Bole on the Bole-Bamboi Road. The Tinga to the Main Pit Site road is a feeder road with no traffic congestions. However, some pressure will be put on the road during the operation and maintenance phase although the impact will be minor	Direct	Short-term	Local	Intermittent	unlikely	Minor	Small	Road Users/ motorists and local residents	Medium	Minor
Impact on socioeconomic norms or taboos	The workers who may be staying in the community may not be aware of some norms and taboos in the community and may fall foul of such norms and taboos e.g., not congregating as a Christian in the community. Such issues may create tensions between locals and the workers if not properly checked/ handle since Tinga is a predominantly Muslim community	Direct	Short-term	local	-	Possible	Low	Medium	Tinga community	High	Major
Sexual Exploitation and Abuse (SEA)/ Sexual Harassment (SH) Risks	SEA/ SH pose significant risk especially being in a rural community. During the operation and maintenance phase of the Tinga CMDC, potential risks of SEA/ SH may arise from diverse workplace dynamics such as extended working hours, interactions with external stakeholders, insufficient training on appropriate code of conduct, and cultural norms that may not prioritize respect and equality.	Direct	Short term	Local	Intermittent	Possible	Low	Small	Tinga community and construction workers	High	Moderate
Process Impacts Due to Winnowing, Cyanidation and Direct Smelting of Gold	**Winnowing:** This technique uses controlled airflow to separate lighter waste particles from heavier gold concentrates. This process can create significant dust and need to be properly managed. Inadequate ventilation or containment can lead to worker health risks and local air pollution.	Direct	Long-term	local	Daily	Possible	Moderate	Medium	Tinga CMDC	High	Major
	Cyanidation: This technique applies a sodium cyanide solution to dissolve gold from ore. The use of cyanide in gold	Direct	Long-term	local	Daily	Possible	Moderate	Medium	Tinga CMDC	High	Major

Impact / Risks	Description of Risks and Impact	Impact Characteristics							Receptor	Sensitivity	Significance of Impact
		Type	Duration	Extent	Frequency	Likelihood	Scale	Magnitude			
	extraction presents risks such as cyanide spills, cyanide-laden tailings, and the potential release of hydrogen cyanide gas.										
	Direct Smelting: Direct smelting heats gold concentrates (plus fluxes such as borax, soda ash, and silica) until molten, separating waste from the metal without using mercury. This process avoids mercury hazards but involves high temperatures, toxic fumes, and burn risks if not properly controlled.	Direct	Long-term	local	Daily	Possible	Moderate	Medium	Tinga CMDC	High	Major

5.5 Alternative Analysis

This project is intended to establish a Clean Mine Demonstration Center at Tinga to eliminate mercury use in ASGM in the project area. The alternative analysis centers on the following:

- Site Selection Option;
- Choice of Building Material for the Tinga CMDC
- Choice of Technology; and
- Do nothing scenario.

5.5.1 Site Selection Option

Two locations were considered for siting the proposed CMDC at Tinga. An original site considered has become close to the main mining pit (0.3km) as a result of expansion and has therefore been discarded.

The site selected at Tinga lies circa 2km northwest of the main mining pit location. The site is not greenfield with no farms or housing structures. The site is easy to access by vehicle and centrally placed between the mining areas. Although the road is not developed, the site is well positioned to receive ore from the mining sites.

5.5.2 Choice of Building Material for the Tinga CMDC

Two main materials were considered for the construction of the Tinga Mine CMDC and they are (i) the use of typical brick/block and mortar and (ii) prefabricated containerised structures.

The use of typical brick/ block and mortar have been proposed for Tinga CMDC i.e., masonry roofed blockwork office since the use of containers will involve cutting down a number of tree crops along the route leading to the site. Again, the containers are not readily available in the Savannah region and transportation of the containers from Tema may be costly coupled with public safety concerns along the transport route (Tema – Bole).

5.5.3 Choice of Technology for the Tinga CMDC

According to the May 2024 Draft Report on the Technology Road Map and Access Finance for ASGM in Ghana by Projekt Consult of Germany and University of Mines and Technology (UMaT) of Tarkwa, Ghana, the processing of gold can be divided into three main steps, each of which is critical and should be tailored to the specific characteristics of the raw material to ensure a high yield linked to efficient use of resources (water, electricity, fuel, chemicals etc.) and a manageable environmental impact. The steps are:

- **Comminution** of gold-bearing material in order to liberate the fine-grained gold particles from the gangue mineral and other waste material in the feed.
- **Gravimetric concentration** of gold due to its very high relative density compared to other minerals from crushed and milled material to obtain the most enriched concentrate possible, which often still contains large amounts of other heavy minerals such as Fe-Ti oxides.
- **Gold separation** in order to finally extract the gold from the concentrate is mainly carried out by mercury amalgamation, (cyanide) leaching or, depending on the fraction of gold in the final concentrate, by applying direct smelting methods.

In terms of alternative processing methods that completely dispense with mercury, the Project Consult/ UMaT consortium provides the following technologies as explained hereunder.

Winnowing

In the application of winnowing, air is blown across the concentrate at a controlled velocity to remove the waste material which is lighter than the gold, thereby leaving free gold particles behind. Winnowing requires that the gold particles be coarse and thus cannot be applied to all types of concentrates.

Improved Gravity Separation Techniques

Some advanced gravity separation techniques have the potential to produce a gold concentrate virtually free from black sands. Some centrifugal concentrators, such as the Knelson and Icon

concentrators, can produce relatively clean concentrates depending on how they are used. Other varieties of equipment such as the ANT and Gold Kachas also produce clean concentrates that can be smelted without recourse to amalgamation.

A comparison between winnowing and gravity separation techniques suggests the following making winnowing the preferred method due to its environmental advantage although winnowing may be less efficient than gravity separation:

- Winnowing a simple sustainable gold extraction method has minimal environmental impact while Gravity Separation requires water, which may lead to sedimentation issues.
- Winnowing is best for dry, loose materials where gold is relatively coarse while Gravity Separation works well for placer and hard rock gold deposits, especially when gold is fine.

Intensive Leaching Using Chlorides

Intensive leaching is applied to concentrates because the gold particles are relatively coarse. The two main chemicals used in intensive leaching are cyanide and hydrochloric acid/hypochlorite. High cyanide concentrations in the region of 2,000mg/l may be used while for ores, the normal concentration could be 250mg/l. Leaching with hydrochloric acid and hypochlorite is much faster than cyanide. However, this combination is very corrosive.

In the case of cyanide, the steps involved include leaching, adsorption, elution, precipitation/electro-winning and smelting while for hydrochloric acid/ hypochlorite the steps are leaching, precipitation, filtration, calcination and smelting. These steps are too many and may not be embraced by small-scale miners.

Cyanide Leaching

Gold may be recovered from ore or tailings by leaching with sodium cyanide and the process is referred to as cyanidation. The process requires a high dissolved oxygen concentration, usually above 12mg/l and pH between 10.5 and 11.0. The high pH is necessary to stabilize cyanide in solution and also prevent the evolution of hydrogen cyanide gas, which is toxic. Sodium cyanide dissolves gold according to the following Equation:

$$4Au+8NaCN+O_2+2H_2O \rightarrow 4[(CN)_2]+4NaOH$$

The cyanidation process could be conducted in agitation systems or non-agitation systems. In agitation systems, the ore is milled very fine in water (below 106μm) and cyanide is introduced into the slurry after pH modification with lime. Leaching may be conducted in tanks for about 24 hours. In the non-agitation processes, the crushed or milled ore may be piled in vats or on impervious floors (heap leaching) and leached over several weeks by ponding or spraying with the leaching reagent.

Also, a comparison between Leaching using chlorides and cyanidation suggests the following making cyanidation the preferred method for gold extraction:

- Cyanide Leaching is highly efficient, with gold recovery rates often exceeding 90% while Chloride Leaching although it can be effective, it may require higher temperatures and stronger oxidizers to achieve comparable recovery rates.
- Cyanide Leaching although toxic has established protocols to make its use safe while Chloride Leaching may be less toxic but can lead to corrosion issues and also requires careful handling.
- Cyanide Leaching is a well-established gold extraction method, with existing infrastructure in most gold-processing plants while Chloride Leaching requires specialized equipment and may have higher operational costs.

Direct Smelting

Direct smelting is a mercury-free process that is applied to the secondary gravity concentrate. This small mass of concentrate, usually less than 100g, is heated with some chemicals known as fluxes and while in the molten state the waste and gold are separated into different layers which are maintained when they solidify.

For direct smelting to be efficient, all iron or steel pieces that were abraded from the grinding equipment during grinding should be removed. Low intensity magnets such as those available in the magnetic alphabet set (educational toy for children) have been found to have the right intensity to remove the abraded material without robbing gold particles.

There are variations in the application of direct smelting. One version, referred to as the 'borax method' uses borax for smelting the concentrate. The borax, which is about three times the mass of concentrate, is mixed with the concentrate and smelted in a furnace. Another version uses the oxy-acetylene flame to smelt gold particle. The version is applied to gold particles that have been cleaned of virtually all the waste material. The flux used is borax and smelting is conducted in shallow crucibles. Due to the very high temperatures generated by the oxy-acety-lene flame, smelting is very fast and can be completed within 15 minutes.

A version of direct smelting which was developed in Ghana applies borax and soda ash to concentrates before smelting. The ratio of concentrate: borax : soda ash : silica sand = 1:1:2:0.1. Due to crucible sizes available, about 50g of concentrate containing a minimum of 0.5g of gold is acceptable. The concentrate is mixed with the flux in the ratios indicated and introduced into a furnace. After some 30 minutes, the crucible is picked from the furnace and poured into a mould, the melt solidifies and the gold can then be separated from the glassy slag.

Borax Method

The 'borax method' uses borax for smelting the concentrate. Borax, which is about three times the mass of the concentrate, is mixed with the concentrate and smelted in a furnace. Smelting can also be conducted using the oxy-acetylene flame. It is applied to gold particles that have been cleaned of virtually all the waste material. Due to the very high temperatures generated by the oxy-acetylene flame, smelting is very fast and can be completed within 15 minutes.

International Experiences from Mercury Reduction Technologies

Any process that can potentially replace mercury must necessarily produce the final gold in a fast, transparent and cheaper way. Considering the mercury-free technologies discussed, winnowing and direct smelting are more suited to the recovery of gold from concentrates. Winnowing is more suitable for coarse gold particles as occurs in some alluvial deposits, but direct smelting can be applied to all.

For the Tinga CMDC, a combination of Winnowing, Cyanidation and Direct Smelting will be used.

5.5.4 Do Nothing Scenario

This will mean maintaining the status quo, which is no CMDC will be established at Tinga and mercury use in in the capturing the gold through amalgamation will continue. The existing use of mercury will persist with its attendant impact on health of miners in the community and the citizens at large.

6.0 RECOMMENDED MITIGATION MEASURES FOR ADVERSE IMPACTS

This chapter presents a description of enhancement measures for the positive impacts and the various mitigation and management measures for adverse impacts and risks, which were characterized as moderate and major in chapter 5. These measures cover the preconstruction, construction, operations and maintenance, and decommissioning phases of the establishment of the Tinga CMDC.

6.1 Proposed Enhancement of Potential Positive Impacts

The implementation of the Tinga CMDC will create employment opportunities for some Ghanaians in general and residents of Tinga in particular. The contractor will put in measures to enhance local employment and business opportunities in the project area. The contractor will continue with the stakeholder engagement and involvement programmed during the construction phase to enhance better relationships between the contractor and the community.

The AEHPMP PIU will encourage the project contractor to adopt a recruitment policy that is geared towards giving priority to residents of Tinga in its recruitment of labor and to some extent those residing in the Bole District. Employment of the youth of the Tinga would be prioritized in the hiring of unskilled labor. The recruitment policy will seek to promote gender equality and guard against GBV/ SEA/ SH. Qualified women will not be discriminated against and would be encouraged to apply for suitable vacancies when they become available.

The positive impacts of the Tinga CMDC on the local and national economy will continue to be sustained through sourcing of materials and equipment from local or Ghanaian suppliers and employment of local subcontractors if required in the delivery of the interventions. With elimination of mercury use in the community, a healthy and conducive environment would be created for individuals and organizations to operate their mining businesses.

6.2 Proposed Adverse Environmental and Social Impacts Mitigation and Management

This section presents a description of various mitigation and management measures for adverse environmental and social impacts which were identified as moderate and major in the preceding chapter. These measures cover the construction, operations and maintenance, and decommissioning phases of the project (**see Table 6-1**).

Table 6-1: Proposed Mitigation and Management Measures of Potential Adverse Environmental and Social Impacts for Tinga

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation **(GHS)**
PRE-CONSTRUCTION PHASE					
Waste generation and disposal	Clearing of solid waste materials i.e. tree stumps, pieces of wood, vegetal waste etc. at the Tinga CMDC site	Tinga CMDC site and the construction environment	○ Provide tricycle to convey solid waste/ vegetal waste from the Tinga CMDC site. ○ personnel engaged in site preparation should deposit all waste generated into the tricycle ○ tricycle should convey solid waste to the district approved waste dump at Tinga.	Supervising consultant, contractor	15,000.00
Project Landtake/ Ease of Access to Project Land	The 0.94 acre (0.38Ha) CMDC site at Tinga has been permanently taken by AEHPMP from the community for the project implementation denying them further access to the piece of land although currently unoccupied	Tinga community	○ ensure land is not for any other use by the community and has been given out by the community themselves ○ document agreement on voluntary donation of the land ○ Obtain necessary permits	AEHPMP PIU	25,000.00
Anxiety on the part of Miners, Institutions and Users of the Tinga CMDC	Lack of involvement/engagement of community people, Miners and other stakeholders' during the project planning phase.	Tinga community members and I&APs	○ Hold consultative meetings with key stakeholders i.e., miners, promoters of the community mining scheme at Tinga during project planning phase. ○ Implement the Stakeholder Engagement Plan (SEP).	AEHPMP PIU, project Consultants	12,000.00
Risk of halting the project construction by regulatory authorities and the World Bank for not acquiring all permits	Non-compliance with national and other relevant laws and regulations triggered by the proposed project at Tinga i.e. LI 1652 (1999), World Bank OP ESSs among others Absence of environmental permit and Bole District Assembly Developmental Permit for the works.	AEHPMP PIU	○ Identify and engage relevant regulatory bodies during the project planning stage. ○ Prepare the relevant instruments necessary for obtaining environmental permit and other relevant authorization permits. ○ Obtain Environmental Permit from EPA and other relevant permits prior to commencement of the construction works	AEHPMP PIU	Included in project cost
Occupational/ public health and safety concerns	Surveying and pegging of Tinga CMDC site	Project Engineers/ PIU Staff, Contractor, Consultants and Tinga community representatives	○ Provide personnel engaged in survey and pegging with appropriate PPEs (nose masks, hard hats, hard boots, reflective jackets etc.) ○ Appoint a contractor and for preparation of Contractor's Health and Safety Plan and ESMP to guide the implementation of environment, health and safety measures for the construction works	AEHPMP PIU, Project Engineers, Contractor	30,000.00

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation **(GHS)**
			○ Educate personnel and engineers engaged in the survey works on the health and safety plan/ code of conduct. ○ Provide first aid box stocked with relevant first aid drugs to treat emergency injuries before transfer of the injured to the nearest health facility for treatment i.e., Tinga CHPS or Bole Government Hospital		
SUBTOTAL					**82,000.00**
CONSTRUCTION PHASE					
Air Quality Deterioration (Dust & exhaust emission generation)	Excavations at the Tinga CMDC	Tinga community	○ Watering of active construction areas to suppress dust generation. ○ Cover construction materials in haulage trucks to construction site (sand, stone, cement, chippings) with tarpaulin ○ Cover construction waste materials during haulage to disposal site ○ Set and enforce speed limits of 20km/hr for haulage and construction trucks on routes to and from the Tinga CMDC site ○ Provide adequate speed limit signage ○ Maintain construction equipment (trucks, concrete mixers, etc.) to minimize exhaust fume emissions ○ Enforce zero-tolerance for burning of construction waste at construction site. ○ Provide construction workers with nose musts during dusty construction activities. ○ Avoid delivery of sand and aggregates during windy conditions ○ Implement the manufacturer recommended engine maintenance programs for all construction equipment and vehicles to minimize the emission of fumes into the environment.	Supervising consultant, Contractor, contractor's safeguards Officer	12,000.00
Vibration and noise nuisance	Use of construction equipment (backhoe, concrete mixer, etc.	Community people, pedestrians and miners who ply the environs of the Tinga CMDC site	○ Deploy light duty construction equipment for the works. ○ Employ standard noise abatement measures (e.g. turning off engine of machinery/	Supervising Consultant	5,000.00

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation (**GHS**)
			equipment when not in use) and engineering good practices to ensure that the impacts are minimized and reduced to acceptable limits. o Ensure that all equipment/ machinery are regularly maintained and operated in accordance with appropriate industry and equipment standards including specifications for noise levels and manufacturer's specifications (including regular checks and maintenance). o Shut down idle construction equipment not in us. o All construction and earthworks should be carried out during the daytime to avoid disturbing the serene nights of residents. o Set speed limit of 20km/hr for construction vehicles/equipment and monitor over speeding. o Provide construction workers with earplugs and earmuffs to wear during noisy activities.		
Loss of Vegetation and Effect on Flora and Fauna	Clearing of the vegetation, excavation and construction activities	Tinga CMDC Site and environs	o Remove trees/ plants on only the designated 0.94 acre (0.38Ha) site o Replant only indigenous plant species in place of cut trees in the environs of the Tinga CMDC	Supervising Engineer	3,000.00
Fire Outbreak	General construction activities	Tinga CMDC Site and environs	o create fire belt around the Tinga CMDC site o obtain fire permit from GNFS prior to construction o educate construction workers to avoid throwing away cigarette buts indiscriminately o appoint a fire team to fight any fires	Contractor, Supervising Engineer	12,000.00
Land degradation and effect on soil resources	Clearing of the Tinga CMDC site in an aggressive weather condition and oil spillages or exposure of the cleared site to the elements of the weather-rain and wind	Tinga CMDC site and environs	o Backfill all trenches for foundation work as quickly as possible o Avoid excavation activities during stormy weather conditions. o Avoid indiscriminate excavation of land at the construction site and excavations should be within the perimeter of the demarcated site	Supervising consultant; contractor	Included in construction cost

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation (**GHS**)
Waste generation and disposal	General construction activities	Contractor's site camp, Tinga CMDC site and the construction environment	○ Provide a tricycle for collection of solid waste only at the Tinga CMDC site. ○ ensure solid waste are disposed of at the approved dump site at Tinga ○ mobile toilet or a pit latrine should be established for the construction workers.	Supervising consultant, contractor	30,000.00
Visual Intrusion/ Attraction	General construction activities	Tinga CMDC site	○ Hoarding should be provided for the CMDC site ○ educative materials and caution notices should be fixed to the hoarding material	Supervising consultant, contractor	Included in construction cost
Labor Influx and related impacts and risks- theft, labor unrest etc.	Job seekers, mainly unskilled youth and some skilled persons. Contractor resorting to the use of cheap labor	Tinga community	○ Minimize labor influx by prioritizing engagement of unskilled labor from within the Tinga community ○ The contractor must exercise due diligence in the hiring of labor from outside the community, including background checks where necessary by involving local opinion leaders ○ Contractor should provide code of conduct of good ethics for construction workers. The Code of conduct must be prepared and approved by the supervising consultant prior to the commencement of the construction works. ○ Train construction workers to be familiar with the code of conduct. ○ Enforce the code of conduct during the construction activities. ○ The Code of Conduct must include zero-tolerance for the construction company, foremen, associates and representatives from mistreating women, children and pedestrians and to accord them with respect regardless of dialect, religion, political opinion, ethnic, nationality, social origin or disability status. ○ The Code of Conduct should be made a part of employment contracts and include sanctions for non-compliance. ○ The construction company must monitor and enforce the Code of Conduct.		Included in construction cost

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation **(GHS)**
			○ Proactively, engage and implement all grievance redress actions required		
Child labour	Contractor resorting to use of cheap labour; improper monitoring of construction labour force	Underage persons	○ Do not engage underage people as construction workers. ***apply also measures for labor influx above***	Contractor, supervising consultant	Included in construction cost
Occupational Health and Safety- risk of injury and harm to construction workers	Handling of construction materials while unprotected; Handling of faulty construction equipment; slip and fall at construction site; injury from obstructions at construction site; vehicular accidents; noisy construction environment	Construction workers	○ Prepare contractor's Health and Safety Plan to provide guidance for ensuring health and safety of construction workers ○ Educate construction workers on the Health and Safety Plan ○ Employ only experienced workers to handle construction equipment ○ Deploy only well serviced construction equipment for the works ○ Ensure regular maintenance of the construction equipment ○ Provide construction workers with appropriate PPEs and enforce their use. ○ Provide safety inductions for construction workers ○ Provide First Aid Box at the construction site stocked with first aid drugs and kits ○ Provide portable toilets at construction site for construction works or an appropriate pit for their use ○ Provide signage at construction site to caution construction workers of potential dangers at the site ○ Report incidents and accidents to the World Bank 24 hours after becoming aware of an incident/accident	Supervising consultant, Contractor.	25,000.00
Public Health and Safety including community safety and security including impacts on community norms and taboos (risk of social conflict)	All construction activities Disrespect towards community people and community norms	Tinga community	○ Provide construction site with adequate/ appropriate hoarding ○ Enforce speed limit of 20km/hr for construction vehicles ○ Educate staff on taboos and norms in the Tinga community including the code of conduct for construction workers ○ community entry engagement should be held with the Tinga community and in line with the Project's SEP	Contractor, supervising consultant	20,000.00

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation **(GHS)**
			○ Proactively, engage and implement all grievance redress actions required		
Emergencies such as fires, and vehicular accidents	Occurrence of bush fires, natural heavy downpour, transport of materials, handling of construction equipment/ machinery/fuel/ naked fires, excavation/trenching etc.	Tinga community, workers, visitors, road users, soil, drains/water bodies	○ Implement Emergency response plan included in Section 7.9. ○ Educate workers on the emergency response plan	Contractor, supervising engineer	20,000.00
Risk of Gender Based Violence (GBV) i.e., Sexual Exploitation and Abuse (SEA) during the project construction	Discrimination or abuse of worker based on the gender of the worker	Construction labor including women, children	○ The contractor must prepare and submit Code of conduct with sanctions for non-compliance. ○ The Code of conduct must acknowledge a zero-tolerance for SEA/ SH on agents, subcontractors, and construction workers. ○ The code of conduct must be submitted and approved by the client through the supervising consultant prior to commencement of the construction works. ***Applicable to code of conduct issues supra (see labor influx impacts)*** ***All workers shall be mandated to sign the CoC prior to commencing work.***	Contractor, supervising consultant	Included in the construction cost
Risk of Sexually Transmitted Diseases (STD) including HIV/ AIDS	Promiscuous attitude of some construction workers	Construction workers, Tinga community	○ Provide STD, HIV/AIDS education and awareness for the construction workers and the Tinga community members to drum home the implications of illicit sex ○ Provide construction workers with condoms, for their use. ○ The contractor's code of conduct should prohibit sexual promiscuity among some construction workers	Contractor, supervising consultant	17,500.00
SUBTOTAL					**144,500.00**
OPERATIONAL PHASE					
Air Quality Deterioration	Processing of the ore, vehicular movement on dusty roads	Tinga community, Tinga CMDC	○ ensure dampening of road ways/ access road to the CMDC ○ ensure filters and other equipment function appropriately and all the time	Management of Tinga CMDC	48,000.00

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation (**GHS**)
Noise Nuisance	Processing of the ore, equipment repairs, vehicular movement etc.	Tinga community, Tinga CMDC	○ equipment manufacturer to integrate noise abating mechanisms in the CMDC equipment and to ensure it is functional all the time ○ equipment including vehicles not in use to be turned off as appropriate	Management of Tinga CMDC	24,000.00
Waste Generation	Workers of the Tinga CMDC and equipment maintenance team	Tinga CMDC and Tinga Waste Dump	○ Immediately collect and dispose all wastes generate during normal operations and also during maintenance. ○ Do not abandon the maintenance waste generated at the CMDC. ○ Ensure that an accredited waste management service provider works along with the maintenance team to immediately collect and transport the wastes to appropriate dump site while recyclables are given to licensed agents. ○ Prepare and implement CMDC facility management plan	Management of Tinga CMDC	36,000.00
Fire Outbreaks and other emergencies	Bush fires and electrical fires	Tinga CMDC and surroundings	○ obtain and renew fire permits obtained from GNFS ○ provide fire extinguishers including fire hydrant for the Tinga CMDC ○ Ensure fire resistant PPE's are used in the smelting area ○ create fire belt around the Tinga CMDC ○ Form fire teams in conjunction with GNFS and ensure their regular training ○ maintain fire teams to fight any fires	Management of Tinga CMDC	30,000.00
Waste water management	Ore processing at Tinga CMDC site	Tinga community and Tinga CMDC	○ monitor waste water quality to ensure that the waste water discharged from the site complies with relevant standards ○ Using appropriate methods of treatment such as physical, chemical or biological ○ Using treated water for non-potable purposes like dust suppression	Management of Tinga CMDC	20,000.00
Occupational health & Safety as well as labor concerns	Work at the Tinga CMDC	Tinga CMDC workers	○ Provide all staff with appropriate PPEs (boots, hard hats, reflective jackets) ○ Engage only experienced personnel for the maintenance works; including qualified HSE officer ○ Provide regular health screening for staff.	Management of Tinga CMDC	60,000.00

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation (**GHS**)
			○ Provide clinic at the Tinga CMDC stocked with First Aid facilities		
Labor Influx and related impacts and risks- conflicts with locals	Tinga CMDC workers	Tinga community	○ Minimize labor issues by developing a labor management plan for the Tinga CMDC ○ The management of the Tinga CMDC must exercise due diligence in the hiring of labor from outside the community, including background checks where necessary by involving local opinion leaders ○ Workers shall be provided with a code of conduct assuring of good ethics for workers. The Code of conduct must be prepared and approved by the management of Tinga CMDC. ○ All the staff must be trained on the code of conduct and be familiar with it. ○ Enforce the code of conduct throughout the operations of the center. ○ The Code of Conduct should be made a part of employment contracts and include sanctions for non-compliance. ○ Management must monitor and enforce the Code of Conduct. ○ Proactively, engage and implement all worker grievance redress actions required ○ Provision of adequate water and sanitation facilities for workers	Management of Tinga CMDC	60,000.00
Public Health and Safety including community safety and security including impacts on community norms and taboos (risk of social conflict)	Disrespect towards community people and community norms	Tinga community	○ Enforce speed limit of 50km/hr for staff/ operational vehicles ○ Educate staff on taboos and norms in the Tinga community including the code of conduct for workers ○ Proactively, engage and implement all worker or community grievance redress actions required	Management of Tinga CMDC	30,000.00
Risk of Gender Based Violence (GBV) i.e., Sexual Exploitation and Abuse (SEA) during operation of the Tinga CMDC	Discrimination or abuse of worker based on the gender of the worker	Staff of Tinga CMDC and Tinga community members	○ Management must ensure availability of Code of conduct with sanctions for non-compliance for all staff ○ The Code of conduct must acknowledge a zero-tolerance for SEA/ SH on agents, and maintenance subcontractors. ○ All staff should be introduced to the Tinga	Management of Tinga CMDC	60,000.00

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation (GHS)
			community and for briefing on their norms and taboos		
Process Impacts Due to Winnowing, Cyanidation and Direct Smelting of Gold	<u>Winnowing</u> Processing of the ore <u>Cyanidation</u> Processing of the ore <u>Direct Smelting</u> Processing of the gold	Staff of Tinga CMDC	○ The processing equipment should have dust suppression systems and filter bags affixed to it for dust collection ○ Also to be provided are screens to help contain fugitive dust ○ Filter bags should be emptied and cleaned regularly ○ Workers are to be provided with appropriate nose masks ○ A secure area for cyanide storage should be established with the provision of a secondary containment of capacity 1.5 times the storage capacity of the cyanide solution ○ There should be continuous pH monitoring to confirm no cyanide leakages from the plant, ○ Training on cyanide handling should be established for operators with reference to the International Cyanide Management Code for best practices in its handling and disposal. ○ Provide Cyanide Antidote Kits at the CDMC ○ The smelting area should have good ventilation ○ Operators should be provided with appropriate PPE for heat exposure ○ Operators should be provided training on flux mixing, furnace operation, and emergency procedures	Management of Tinga CMDC	120,000.00
SUBTOTAL					**488,000.00**
DECOMMISSIONING PHASE					
Breach of environmental regulatory compliance pertaining to decommissioning of the Tinga CMDC	Lack of conforming to national laws and international regulations regarding decommissioning of a CMDC	Regulatory bodies and funding agency i.e., EPA, World Bank	○ Prepare a comprehension ESMP including health and safety plan for decommissioning of the Tinga CMDC ○ Obtain all necessary permits and approvals prior to decommissioning of the Tinga CMDC	Management of Tinga CMDC	Cost to be provided by Management of Tinga CMDC

Anticipated Environmental & Social Impacts/ Risks	Source of Impact	Receptor(S)	Proposed Mitigation and Management Measures	Responsibility	Estimated cost of implementation (**GHS**)
Injury, harm and accident to personnel engaged in decommission	All decommissioning works, use of equipment	Construction workers and supervisors engaged in decommissioning	○ Provide decommissioning personnel with PPE (boots, hard hats, reflective jackets) ○ Engage only experienced workers. ○ Provide the workers portable toilets on site. ○ Provide workers with First Aid Box ○ Provide appropriate signage on the decommissioning	Management of Tinga CMDC	Cost to be provided by Management of Tinga CMDC
Waste generation and management	Wastes generated from decommissioning	Miners and Tinga community	○ Prepare a Waste Management Plan to manage the decommissioning solid and liquid wastes. ○ Immediately collect and dispose all wastes generated during decommissioning ○ Dispose all municipal solid waste at Tinga dump site and release recyclables to agents for reuse/ recycle. ○ Do not dispose decommissioned waste into a water bodies	Management of Tinga CMDC	Cost to be provided by Management of Tinga CMDC
Occupational health and safety/ Public safety issues		(Similar to construction phase)	(apply mitigation measures for construction phase)	Management of Tinga CMDC	Cost to be provided by Management of Tinga CMDC
Air pollution and Noise			(apply mitigation measures for construction phase)		
All other environmental and social impacts		Bio-physical and social environments	A detailed ESIA/ ESMP will be carried out for approval and permitting before final decommissioning of facilities and to confirm impacts and appropriate mitigation measures for implementation	Management of Tinga CMDC	Cost to be provided by Management of Tinga CMDC

7.0 ENVIRONMENTAL AND SOCIAL ACTION PLANS AND MONITORING PROGRAMMES

7.1 Environmental Monitoring Plan

The monitoring of various environmental and social parameters will help to confirm any impacts or risks and assess the effectiveness of the implementation of the mitigation measures outlined. By way of monitoring, a change in a predicted impact can be reviewed. Where observed impact levels exceed the expected levels, additional appropriate mitigation measures will then be instituted. Monitoring will also identify and confirm any residual impacts, which are normal with the development of such a project and ensure that these do not escalate to significant adverse levels.

7.1.1 Monitoring Objectives

The AEHPMP PIU is committed to ensuring effective protection of the environment, the construction site, workers and the general public. The objectives of the monitoring program are to:

i. Confirm any predicted impact or otherwise made from the environmental and social assessment during project implementation;
ii. Ensure that all mitigation and control measures are operating efficiently and with desired effect;
iii. Provide information to develop improved practices and procedures for environmental protection, community health/safety and worker safety, if necessary;
iv. Detect changes in the receiving environment and enable analysis of their causes; and
v. Enable effective liaison with stakeholders and community members, including addressing complaints and concerns.

The Plans are also expected to provide useful guidance for the successful planning and implementation of similar projects that will be undertaken by the AEHPMP PIU.

7.1.2 Environmental Monitoring Program

A monitoring programme will be instituted and carried out and relevant records will be kept to ensure compliance with sound environmental and social practices. The major environmental and social issues for which monitoring will focus on include:

- Ambient air quality, in conformity with the Ghana Standards on Ambient air Quality Requirements GS 1236: 2019;
- Ambient noise levels, in conformity with the Ghana Standards on Ambient Noise Control Requirements GS 1212:2018
- Effluent Quality, in conformity with the Ghana Standards on Effluent Discharge Requirements GS:1212: 2019
- Surface water quality;
- Loss of vegetation/habitat and impact on fauna;
- Waste generation and disposal;
- Use of personal protective equipment (PPE);
- Accidents, worker injury and health/safety;
- Labour issues such as engaging underage persons and labour influx at construction sites/local communities;
- Emergency Flooding.
- Community/ public safety/health/ security and traffic;
- RoW issues/security; and
- Stakeholder engagement and public/community complaints.

The environmental monitoring program/plan for the Tinga CMDC is set out in **Table 7-1**.

Table 7-1: Environmental and Social Impacts and Risks Mitigation Measures Implementation Monitoring Plan for Tinga CMDC

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
PRE-CONSTRUCTION PHASE							
Anxiety on the part of potentially affected persons/ stakeholders	○ Hold consultative meetings with key stakeholders i.e. Tinga Community Mining Committee, I&APs during project planning phase. ○ Implement Stakeholder Engagement Plan (SEP). ○ Put in place Grievance Redress Mechanism and involve local residents and key stakeholders in the grievance resolution processes	○ Record of stakeholder meetings ○ Availability of SEP for the project ○ Availability of GRM for the project	Tinga CMDC. Tinga community.	Review of relevant reports or records	Monthly	AEHPMP PIU	Included in Tinga CMDC project cost
Risk of halting the project construction by regulatory authorities and the World Bank	○ Identify and engage relevant regulatory bodies during the project planning stage. ○ Prepare the relevant instruments necessary for obtaining environmental permit and other relevant authorization permits. ○ Obtain Environmental Permit from EPA and other relevant permits prior to commencement of the construction works	○ Availability of EPA Environmental permit and other developmental permits for the works	AEHPMP PIU	Inspections of relevant plans and reports including validity of permits/licences	Yearly	AEHPMP PIU,	Included in Tinga CMDC project cost
Occupational/ public health and safety concerns	○ Provide personnel engaged in survey and pegging with appropriate PPEs (hard hats, hard boots, reflective jackets etc.) ○ Prepare Contractor's Health and Safety Plan to guide the implementation of health and safety measures for the construction works ○ Educate personnel and construction workers engaged in the survey works on the health and safety plan. ○ Provide first aid box stocked with relevant first aid drugs to treat emergency injuries before	○ Availability of Contractor's Health and Safety Plan. ○ Knowledge of workers on the Contractor's Health and Safety Plan ○ Personnel wearing appropriate PPEs. ○ Availability of first aid box stocked with relevant drugs	AEHPMP PIU	Inspections of health and safety plan, and review of incident and other relevant records and reports	Inspection of contractor's health and safety plan will be done one time, prior to commencement of construction. Education of workers will be done at induction, semi-annually, and	AEHPMP PIU	Included in Tinga CMDC project cost

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	transfer of the injured to the nearest health facility at for treatment				refreshers after major incidents weekly inspection of first aid box, PPE and signage		
Waste generation and disposal	○ Provide tricycle for disposal of waste, spoil wood etc. ○ Personnel engaged in site preparation should gather and deposit all waste generated into the tricycle ○ Tricycle should transport waste to the approved waste dump at Tinga	○ Availability of dust bins to personnel to store waste ○ All construction waste deposited in appropriate and labelled waste	AEHPMP PIU	Inspections	Quarterly	AEHPMP PIU	Included in Tinga CMDC project cost
CONSTRUCTION PHASE							
Air Quality Deterioration (Dust & exhaust emission generation)	○ Watering of active construction site to suppress dust generation. ○ Cover construction materials in haulage to construction site (sand, stone, cement, chippings) with tarpaulin ○ Cover construction waste materials during haulage to disposal sites ○ Set and enforce speed limits of 20km/hr for haulage and construction trucks at dusty areas in the construction sites and community. ○ Provide adequate speed limit signages.	○ Absence of observable particulate matter and exhaust fumes in air within the construction site ○ Record of watering at construction site ○ Construction workers wearing nose masks ○ Availability of signages showing speed limits for construction vehicles and machinery ○ Record of maintenance of construction equipment/trucks deployed for the construction	Tinga CMDC site	Visual monitoring	Weekly	Contractor, contractor's safeguards Officer, Supervising consultant	60,000.00

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	○ Maintain construction equipment (trucks, concrete mixers, etc.) to minimize exhaust fume emissions ○ Switch off idle construction machinery and equipment ○ Enforce zero-tolerance for burning of construction waste at construction sites. ○ Provide construction workers with nose musts during dusty construction activities. ○ Avoid delivery of sand and aggregates during windy conditions ○ Implement the manufacturer recommended engine maintenance programs for all construction equipment and vehicles to minimize the emission of fumes into the environment.						
Vibration and noise nuisance	○ Deploy light duty construction equipment for the works. ○ Employ standard noise abatement measures (e.g. turning off engine of machinery/ equipment when not in use) and engineering good practices to ensure that the impacts are minimized and reduced to acceptable limits. ○ Undertake earthworks and other noise and vibration making activities in phases to reduce noise generation during construction. ○ Ensure that all equipment/ machinery are regularly maintained and operated in accordance with appropriate industry and equipment standards including specifications	○ Record of maintenance of construction equipment/machinery ○ Complaints by the Tinga community about excessive noise from the construction ○ Construction workers wearing earplugs during noisy activities	Tinga CMDC site	Inspection of Grievance reports	Weekly	Contractor, contractor's safeguards Officer, Supervising consultant	12,000.00

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	for noise levels and manufacturer's specifications (regular checks and maintenance). o Shut down idle construction equipment not in use. o All construction and earthworks should be carried out during the daytime to avoid disturbing the serene nights of residents. o Set speed limit of 20km/hr for construction vehicles/ equipment and monitor over speeding. o Provide construction workers with earplugs and earmuffs to wear during noisy activities.						
Soil erosion of excavated land at Tinga CMDC site	o Backfill all trenches for foundation work as quickly as possible o Avoid excavation activities during stormy weather conditions. o Avoid indiscriminate excavation of land at the construction site and excavations should be within the perimeter of the demarcated site	o Backfilling observed at the CMDC site and well compacted o All excavated areas reinstated and landscaped.	Tinga CMDC site	Site inspections	Weekly	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost
Risk of injury and harm to construction workers (Occupational Health and Safety)	o Prepare contractor's Health and Safety Plan to provide guidance for ensuring health and safety of construction workers o Educate construction workers on the Health and Safety Plan o Employ only experienced workers to handle construction equipment o Deploy only well serviced construction equipment for the works o Ensure regular maintenance of the construction equipment	o Availability of contractor's Health and Safety Plan o Awareness of construction workers of the Contractor's Health and Safety Plan o Observable availability of PPEs for construction workers o First Aid Box available at construction site stocked with appropriate kits o Construction workers wearing appropriate PPEs. o Record of induction trainings for workers o Toilet provided at construction	Tinga CMDC site	Inspections of plan, and review of incident and other relevant records and reports	Inspection of contractor's health and safety plan will be done one time, prior to commencement of construction. Education of workers will be done at induction, semi-annually, and	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	○ Provide construction workers with appropriate PPEs and enforce their use. ○ Provide safety inductions for construction workers ○ Provide First Aid Box at the construction site stocked with first aid drugs and kits ○ Provide portable toilets at construction site for construction works or an appropriate pit for their use ○ Provide signage at construction site to caution construction workers of potential dangers at the site	site for construction workers use. ○ Appropriate signage at construction. ○ Workers understanding of each signage ○ Number of construction workers injured			refreshers after major incidents Weekly inspection of first aid box, PPE and signage.		
Community Health and safety	○ Provide construction site with adequate/ appropriate hoarding ○ Enforce speed limit of 20km/hr for construction vehicles ○ Educate staff on taboos and norms in the Tinga community including the code of conduct for construction workers ○ community entry engagement should be held with the Tinga community and in line with the Project's SEP ○ Proactively, engage and implement all grievance redress actions required	○ Hoarding provided at construction site. ○ Absence of unauthorized persons within the inner perimeter working area ○ Observable availability of appropriate signage at the construction site ○ Observable absence of construction materials and construction wastes stockpiled at the construction site ○ Construction drivers observing 20km/hr speed limit. ○ Number of members of the public injured/harmed at the construction site	Tinga CMDC site	Site inspections and review of incident reports	Weekly	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost
Emergencies such as fires, and vehicular accidents	○ Implement Emergency response plan included in Section 7.9. ○ Educate workers on the emergency response plan	○ records of emergencies e.g., fire incidents ○ number of engagements/ training conducted	Tinga CMDC site	Review of incident and training reports/records	Weekly	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
Waste generation and disposal	○ Provide a tricycle for collection of solid waste only at the Tinga CMDC site. ○ ensure solid waste are disposed of at the approved dump site at Tinga ○ mobile toilet or a pit latrine should be established for the construction workers.	○ Availability of contractor's Waste Management Plan ○ Observable availability of tricycle to convey waste to dump site. ○ Construction workers disposing construction solid waste and housekeeping waste into designated area and into tricycle ○ Regular transfer of waste to approved waste dump ○ Absence of stockpile of construction waste at construction site ○ Record of disposal of construction waste to approved sites	Tinga CMDC site	Inspections and record keeping of waste manifest	Weekly	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost
Visual Intrusion/ Attraction	○ Hoarding should be provided for the CMDC site ○ educative materials and caution notices should be fixed to the hoarding material	○ Hoarding in place ○ caution notices provided on hoarding material	Tinga CMDC site	Site inspections	Weekly	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost
Labor Influx and related impacts and risks- theft, labor unrest etc.	○ Minimize labor influx by prioritizing engagement of unskilled labor from within the Tinga community ○ The contractor must exercise due diligence in the hiring of labor from outside the community, including background checks where necessary by involving local opinion leaders ○ Contractor should provide code of conduct of good ethics for construction workers. The Code of conduct must be prepared and approved by the supervising consultant prior to the commencement of the construction	○ Record on code of conduct training held for the workers. ○ Number of labour related complaints reported ○ Complaints by residents	Tinga CMDC site	Inspections and reports of violations/incidents	Weekly	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	works. o Train construction workers to be familiar with the code of conduct. o Enforce the code of conduct during the construction activities. o The Code of Conduct must include zero-tolerance for the construction company, foremen, associates and representatives from mistreating women, children and pedestrians and to accord them with respect regardless of dialect, religion, political opinion, ethnic, nationality, social origin or disability status. o The Code of Conduct should be made a part of employment contracts and include sanctions for non-compliance. o The construction company must monitor and enforce the Code of Conduct. o Proactively, engage and implement all grievance redress actions required						
Child labour	o Do not engage underage people as construction workers. ***apply also measures for labor influx above***	o Record on code of conduct training held for the workers. o Number of child labour reported o Complaints by residents	Tinga CMDC site	Incident report	Weekly	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost
Risk of Gender Based Violence (GBV) i.e., Sexual Exploitation and Abuse (SEA) during the project construction	o The contractor must prepare and submit Code of conduct with sanctions for non-compliance. o The Code of conduct must acknowledge a zero-tolerance for SEA/ SH on agents, subcontractors, and construction workers. o The code of conduct must be submitted and approved by the	o Availability of contractor's code of conduct o Number of workers who signed the Code of conduct as condition for their employment. o Records of sanctions for workers who abused the code of conduct. o Record of periodic sensitization of construction workers on GBV issues	Tinga CMDC site	Incident reports	Weekly	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	client through the supervising consultant prior to commencement of the construction works. ***Applicable to code of conduct issues supra (see labor influx impacts)***	○ Number of construction workers charged with GBV offence					
Risk of Sexually Transmitted Diseases (STD) including HIV/ AIDS	○ Provide STD, HIV/AIDS education and awareness for the construction workers and the Tinga community members to drum home the implications of illicit sex ○ Provide construction workers with condoms, for their use. ○ The contractor's code of conduct should prohibit sexual promiscuity among some construction workers	○ Record of HIV/STD education and awareness campaigns ○ Availability of condoms for construction workers ○ Contractor's code of conduct prohibiting sexual promiscuity.	Tinga CMDC site	Engagement and incident reports	Weekly	Contractor, contractor's Safeguards Officer, Supervising consultant.	Included in construction cost
SUBTOTAL							**72,000.00**
OPERATIONAL PHASE							
Air Quality Deterioration	○ ensure dampening of road ways/ access road to the CMDC ○ ensure filters and other equipment function appropriately and all the time	○ Availability of air quality monitoring records ○ Air quality measurements meeting GS1236: 2019 limits for NOx, COx, SOx, $PM_{2.5}$, PM_{10} and TSP. measurements	Tinga CMDC	Insitu measurement	Monthly measurements in line with GS 1236:2019	CMDC Management	95,000.00
Noise nuisance	○ equipment manufacturer to integrate noise abating mechanisms in the CMDC equipment and to ensure it is functional all the time ○ equipment including vehicles not in use to be turned off as appropriate	○ Leq, Lmax, Lmin (dBA) measurements meeting GS 1222: 2018 limits ○ Complaints by the Tinga community about excessive noise from the operations ○ Workers wearing earplugs in designated areas in the CMDC	Tinga CMDC	Insitu measurement	Monthly measurements in line with GS 1222:2018	CMDC Management	18,000.00
Waste Generation and Management	○ Immediately collect and dispose all wastes generate during normal operations and also during maintenance. ○ Do not abandon the maintenance waste generated at the CMDC.	○ Absence of stockpiled waste at the Tinga CMDC. ○ Availability of waste bins at Tinga CMDC ○ Availability of Facility management plan	Tinga CMDC	Insitu measurement	Weekly	CMDC Management	54,000.00

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	○ Ensure that an accredited waste management service provider works along with the maintenance team to immediately collect and transport the wastes to appropriate dump site while recyclables are given to licensed agents. ○ Prepare and implement CMDC facility management plan	○ Record of disposal of maintenance waste at approved disposal site					
Management of Hazardous Chemicals including Cyanide	Winnowing ○ The processing equipment should have dust suppression systems and filter bags affixed to it for dust collection ○ Also to be provided are screens to help contain fugitive dust ○ Filter bags should be emptied and cleaned regularly ○ Workers are to be provided with appropriate nose masks	○ Dust measurements meeting GS1236: 2019 limits for $PM_{2.5}$, PM_{10} and TSP	Processing Plant at Winnowing	Insitu measurement	Monthly	Tinga CMDC Management	36,000.00
	Cyanidation ○ A secure area for cyanide storage should be established with the provision of a secondary containment of capacity 1.5 times the storage capacity of the cyanide solution ○ There should be continuous pH monitoring to confirm no cyanide leakages from the plant, ○ Training on cyanide handling should be established for operators with reference to the International Cyanide Management Code for best practices in its handling and disposal.	○ Monitoring of wastewater quality discharges for Cyanide and pH	Recycling Ponds	Insitu Measurement of pH and Lab analysis for Cyanide	Monthly	Tinga CMDC Management	24,000.00
	Direct Smelting		Smelting Plant		Quarterly		30,000.00

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	○ The smelting area should have good ventilation ○ Operators should be provided with appropriate PPE for heat exposure ○ Operators should be provided training on flux mixing, furnace operation, and emergency procedures	○ Monitoring of Heat Stress		Heat Stress Monitoring Instrument		Tinga CMDC Management	
Fire Outbreaks and other emergencies	○ obtain and renew fire permits obtained from GNFS ○ provide fire extinguishers including fire hydrant for the Tinga CMDC ○ create fire belt around the Tinga CMDC ○ Form fire teams in conjunction with GNFS and ensure their regular training ○ maintain fire teams to fight any fires	○ Validity of Fire Permit ○ availability of fire extinguishers at the Tinga CMDC ○ evidence of fire belt ○ records of training of staff by GNFS of fire safety ○ evidence of fire team at the Tinga CMDC	Tinga CMDC	Inspect Permits Confirm adequacy of fire extinguishers Review effectiveness of fire belts, fire trainings and responsiveness of fire teams	Yearly	CMDC Management	24,000.00
Occupational Health & Safety issues	○ Provide all staff with appropriate PPEs (boots, hard hats, reflective jackets) ○ Engage only experienced personnel for the maintenance works; ○ Provide regular health screening for staff. ○ Provide clinic at the Tinga CMDC stocked with First Aid facilities	○ Tinga CMDC personnel wearing appropriate PPEs at work ○ Record of regular health screening for personnel ○ established clinic at the Tinga CMDC	Tinga CMDC	Audits and incident reports Impromptu checks Inspection of health screening records Inspection of first aid facilities	Monthly	CMDC Management	60,000.00
Labor Influx and related impacts and risks- conflicts with locals	○ Minimize labor issues by developing a labor management plan for the Tinga CMDC ○ The management of the Tinga CMDC must exercise due diligence in the hiring of labor from outside the community, including background checks	○ Evidence of a labor management plan and being implemented ○ Availability of signed Code of Conduct by all staff	Tinga CMDC	Review labour management reports Reviewhiring reports Review record on infractions or	Quarterly	CMDC Management	60,000.00

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	where necessary by involving local opinion leaders ○ Workers shall be provided with a code of conduct assuring of good ethics for workers. The Code of conduct must be prepared and approved by the management of Tinga CMDC. ○ All the staff must be trained on the code of conduct and be familiar with it. ○ Enforce the code of conduct throughout the operations of the center. ○ The Code of Conduct should be made a part of employment contracts and include sanctions for non-compliance. ○ Management must monitor and enforce the Code of Conduct. ○ Proactively, engage and implement all worker grievance redress actions required			breaches to the Code of Conduct Review training records Assess effectiveness of GRM structures			
Community Health and Safety including community safety and security including impacts on community norms and taboos (risk of social conflict)	○ Enforce speed limit of 50km/hr for staff/ operational vehicles ○ Educate staff on taboos and norms in the Tinga community including the code of conduct for workers ○ Proactively, engage and implement all worker or community grievance redress actions required	○ Record of accidents/ incidents involving people in the community	Tinga CMDC	Audits and incident reports Inspection of accident records Inspection of training records	Monthly	CMDC Management	60,000.00
Risk of Gender Based Violence (GBV) i.e., Sexual Exploitation and Abuse (SEA) during the operation of the Tinga CMDC	○ Management must ensure availability of Code of conduct with sanctions for non-compliance for all staff ○ The Code of conduct must acknowledge a zero-tolerance for SEA/ SH on agents, and maintenance subcontractors.	○ Availability of code of conduct and signed by all staff	Tinga CMDC	Audits and incident reports Review record on infractions or breaches to the Code of Conduct	Monthly	CMDC Management	36,000.00

Anticipated Environmental & Social Impacts/ Risks	Proposed Mitigation and Management Measures	Parameters for monitoring	Monitoring location	Method	Frequency of monitoring	Responsibility	Estimated cost of implementation (GHS)
	○ All staff should be introduced to the Tinga community and for briefing on their norms and taboos			Review GBV-SEA/SH training records			
SUBTOTAL							**497,000.00**

7.1.3 Key Responsibilities for the Monitoring Program

The primary responsibility for implementation of the environmental and social monitoring program during the construction phase is the Contractor. The Contractor will be required to hire an Environment, Health and Safety (EHS) Officer or Manager (Environmental and Social Safeguards Officer) responsible for implementing the Environment, Social, Health and Safety (ESHS) mitigation and management actions, including the schedule to the environmental permit (permit conditions) and other lending covenants of the World Bank.

Through the Safeguards Officer, the Contractor must ensure day-to-day monitoring of all environmental and social impacts mitigation measures implementation by the workers and provide regular standalone bi-weekly safeguards monitoring reports to the Client including violation of any approved procedures i.e., Code of Conduct, etc.

All the reports should capture progress and status on implementation of the mitigation measures arising from the ESMP implementation, considering the monitoring indicators but not limited to the following:

- Contractors' performance on implementing environmental and social safeguards;
- Progress on mitigation measures in relation to identified risks and impacts;
- Emerging impacts and proposed mitigation measures (if encountered);
- A presentation on parameters monitored in the reporting period;
- Activities to be taken in the following period;
- Capacity building needs that may be required

Relevant pictures should be included in the report.

Supervising Consultant

Staff of the Inspectorate Division of the Minerals Commission and the Regional EPA Office will provide oversight responsibility to ensure that the contractor is fulfilling the mitigation measures implementation responsibility under this ESMP. The contractor will submit their monitoring reports through the supervising consultant who will validate and forward them to the PIU through any of the safeguards persons at the PIU. The supervising consultant will coordinate the day-to-day monitoring of the implementation of the ESMP, Permit Conditions, and the contractors' safeguards commitment documents.

AEHPMP Safeguards Specialists

The AEHPMP-PIU Safeguards Focal Person(s) will regularly conduct monitoring field visits to the construction site at Tinga to inspect activities and verify the reports presented by the contractor and supervising consultant and make their own findings. They will provide guidance for any remedial actions where there is the need to prevent non-compliance and recurrence of inaction on the part of any stakeholder. The ESMP monitoring results will be continuously evaluated by the AEHPMP PIU as part of the project supervision and this will allow for corrective actions to be taken when needed. The PIU will compile a regular safeguard monitoring reports for submission to the World Bank and EPA in line with environmental permit conditions requirement.

It is proposed to establish an ESHS committee for the purposes of the following:

- Hold regular meetings where representatives from contractor and the client can discuss progress, challenges, and mitigation efforts.
- Ensure that schedules, activities, and resource requirements are prioritized to minimize conflicts and maximize efficiency.
- Review and ensure that the contractor is adhering to the environmental and social management plans developed and the monitoring of their implementation.
- Share best practices, lessons learned, and strategies for mitigating potential impacts on the environment and social norms at the local level.
- Identify and assess potential risks and impacts that may arise from the implementation of the project at Tinga.
- Develop strategies to mitigate and manage risks effectively, including emergency response protocols and contingency plans.

- Coordinate community engagement efforts to ensure consistent messaging and outreach across all project components.
- Address community concerns, feedback, and grievances to enhance transparency and trust.
- Establish health and safety protocols and standards to promote a safe working environment for all workers involved in the project.
- Share information on safety incidents, near misses, and lessons learned to enhance safety performance across other projects.

The ESHS committee so constituted will not be limited to representatives from the Contractor, Project Engineer and/ or Supervising Consultant, Safeguards Officer, Tinga Community Mining Committee and the Bole District Assembly:

By addressing the above mentioned key issues through the ESHS committee in regular coordination meetings, the AEHPMP PIU will foster collaboration, synergy, and alignment with the contractor to ensure performance across all the components of the project, and greater overall efficiency in project implementation.

Although the primary responsibility for the implementation of the monitoring program during the construction phase is the Contractor, it is preferable that the Contractor engages an independent specialist or company to undertake the air quality, noise level and water/ wastewater quality monitoring to ensure objectivity of the results/recommendations.

The Management of the Tinga CMDC has the primary responsibility for ESHS monitoring during the operational and maintenance phase of the project.

During the construction and operational phases, the EPA will periodically carry out site visits and review monitoring reports received from the AEHPMP-PIU to verify compliance with the monitoring program and the schedule to the environmental permit (permit conditions).

7.2 Contractors Environmental and Social Safeguards Commitment Strategy

Documents Requirements

Prior to their selection and commencement of the construction works and in line with international good practices, the Contractor will be required to prepare a few safeguards commitment documents which will provide the contractor's specific strategies for dealing with the potential environmental and social impacts mitigation requirements as provided in this ESMP document. The documents shall be reviewed and assessed for their adequacy by the supervising consultant. Together with this ESMP, the contractor's strategies will be monitored for compliance during the construction period. The strategies shall describe the resources allocated to and the personnel responsible for the execution of each task and requirements contained therein, roles and responsibilities of key construction staff including construction supervisors, the EHS Officer/ and the project Manager in the monitoring and management of key environmental and social impacts mitigation activities. These documents are outlined below:

7.2.1 Contractor's Health and Safety Plan/Strategy

The contractor's health and safety plan will provide information on the contractor's procedures relating to occupational health and safety of his workers and public health and safety for the work they are responsible for under the contract. The Plan shall be guided by the World Bank's Health and Safety Guidelines as well as the Ghana Factories, Offices and Shops Act 328 (1970), etc.

The Contractor shall appoint an Environment Social Health and Safety (ESHS) Manager for the project, who will report to the Project Manager (PM) of the PIU. The responsibilities of the ESHS Manager include, among other things:

- Implement the environmental, health and safety measures on the project.
- Enforce the environmental permit conditions and mitigation, monitoring and management measures.

- Liaise with the PM to ensure all required PPEs, waste bins and other logistics are provided for the works;
- Identify appropriate training programs in ESHS for the workers.
- Ensure all machinery and equipment are in good working condition and are well serviced;
- Ensure all operators adhere to environment, health and safety procedures;
- Liaise with regulatory institutions such as EPA on all ESHS matters relating to the execution of the proposed project at Tinga;
- Keep records and reports of all incidents/accidents and illnesses.
- Report all complaints from the community and other stakeholders/workers concerning environmental, social, health and safety issues to the PM of the PIU;
- Report all non-compliances of environmental, social, health and safety procedures to the PM of the PIU for appropriate action; and
- Enforce disciplinary actions against workers who do not comply with health and safety procedures.

7.2.2 Contractor's Environmental and Social Management Plan (C-ESMP)

The C-ESMP shall be based on this ESMP with a focus on construction activities. The C-ESMP shall, among other things, identify the construction phase activities, risks/impacts, take into consideration the mitigation and monitoring measures and their management arrangements captured in the ESMP, describe resource allocation and assign roles and responsibilities for the execution of each task.

7.2.3 Contractor's Waste Management Plan

The contractor's Waste Management Plan should cover both solid and liquid waste that will be generated during the construction activities to ensure environmental protection and a clean environment. The Plan should include specific procedures for tracking of loads of solid waste, disposal site and protocols for the maintenance of records of the quantities of wastes generated, reused, and disposed.

7.2.4 Contractor's Traffic Management Plan

The Contractor's Traffic Management Plan should address issues including strategies for ensuring safety of workers, pedestrians, and other motorists. Traffic may not be a major concern but the nature of the road to Tinga requires trucks to move below the 50km/hr mark.

7.2.5 Contractor's Code of Conduct/Ethics

The contractor's Code of Ethics/Conduct shall contain obligations on the company to foster a well-organized, respectful, and collaborative environment at the workplace and in the project community of Tinga during the period of the contract. Code of Conduct shall be provided to include but not limited to the following:

i.Compliance with applicable laws, rules, and regulations of the jurisdiction;

ii. Compliance with applicable health and safety requirements (including wearing prescribed personal protective equipment (PPE), preventing avoidable accidents and at duty to report conditions or practices that pose a safety hazard or threaten the environment.

iii. Zero tolerance to the use of illegal substances (such as alcohol and narcotics during working hours);

iv. Non-Discrimination (e.g. on the basis of family status, ethnicity, race, gender, religion, language, disability, or political conviction);

v. Attitude of respect and non-discrimination during interactions with community members (e.g. to convey an attitude of respect and non- discrimination);

vi. Sexual harassment, sexual exploitation (e.g. to prohibit use of language or behavior, in particular towards women or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate);

vii. Violence or exploitation (e.g. the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading or exploitative behavior);

viii. Protection of children (including prohibitions against abuse, defilement, or otherwise

unacceptable behavior with children, limiting interactions with children, child labor and ensuring their safety in the project area);

ix. Protection and proper use of property (e.g., to prohibit theft, carelessness or waste);

x. Duty to report violations of this Code;

xi. No retaliation against workers who report violations of the Code, if that report is made in good faith;

xii. The Code must include sanctions against violations of the Code; and

xiii. Provision that all Company Managers and individual construction workers shall sign the Code of Conduct Declaration Form as below:

Code of Conduct Declaration Form

I hereby acknowledge receipt of my copy of the Contractor's code of ethics/conduct which has been written in plain language and explained to me. I acknowledge that adherence to this Code of ethics/conduct is a condition of my employment and I understand that violation of this code can result in serious consequences, up to and including dismissal, referral to legal authorities, forfeiting payments, termination of contract and eventually may have debarments implications.

- ***Name of Employee***
- *Name……..……..……Position*
- *Signature……..……*
  Date……..

In addition to the Contractor's own Code of Ethics/Conduct, they shall adopt wholly and implement the requirements of the Client's own Code of Conduct for Preventing Gender- Based Violence (GBV)/Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH) and Violence Against Children (VAC) provided in **Annex 7-1** of this document. All requirements therein are obligatory and bidding on the Contractor under the contract of the works he/she is responsible for.

7.3 Environmental Committee for the Operational Phase

The PIU will constitute an ESHS committee comprising safeguard staff and representatives of relevant regulatory institutions such as EPA, Bole District Assembly, GNFS at the district among others. The main task of this committee is to formulate and implement policies to address environmental and social impacts during the operational phase.

7.4 Annual Environmental and Safety Audit and Reviews

The PIU will in collaboration with consultants undertake an annual environmental, social, health and safety audit of the AEHPMP interventions at Tinga. Issues or gaps identified will be referred and for redress by the PIU. The PIU will also carry out quarterly reviews of its safeguards performance. The monitoring program will also provide relevant information for effective auditing and reviews.

7.5 Compliance with Statutory Obligations

The PIU and the Management of the Tinga CMDC will comply with all relevant statutory obligations including:

i. Obtaining an Environmental Permit from the EPA, through submission of this ESMP and paying the relevant processing and permit fees.

ii. Compliance with the schedule/ conditions to be attached to the EPA's environmental permit for the Tinga CMDC including.
   a. Submitting necessary monthly/quarterly monitoring reports to EPA or as provided in the permit schedule to be issued.
   b. Submitting an Annual Environmental Report (AER) of the Tinga CMDC activities after 12 months from the commencement of works in accordance with Regulation 25 of LI 1652.

iii. Complying with the requirements of the Bole District Assembly/ by-laws.

Submission of EMP during Operations in Line with LI 1652

The PIU will submit an Environmental Management Plan (EMP) of the Tinga CMDC activities to the EPA within 18 months of commencement of operations in accordance with Regulation 24 of LI 1652.

The PIU/ Management of Tinga CMDC and Contractor will also be required to comply with all WB monitoring and reporting requirements.

7.6 Document Control and Tracking

Documentation

The PIU/ Management of the Tinga CMDC will keep records on all environmental, social health and safety (ESHS) data including, environmental emergencies. The ESHS data will be kept in both electronic and hard copy formats. A format for documentation of information in electronic form will be developed to capture daily/weekly information on environmental sampling/monitoring, environmental quality results, waste generation and disposal, environmental incidences and emergencies, training and awareness creation programs such as community fora/ workshops and meetings.

Document Tracking and Control

PIU/ Management of the Tinga CMDC will establish and maintain procedures to control all documents and permits that are required to ensure compliance and to make sure that:

- All documents and permits are easily traceable;
- All statutory documents are periodically reviewed, revised as necessary and approved as adequate by the relevant regulatory agencies;
- All permits and approvals are renewed as and when necessary; and
- Current versions of relevant documents are available on site.

7.7 Project Facilities Management

The facilities will be maintained and managed in accordance with international good practices. The potential environmental/technical concerns that will be addressed include:

i. quality of the construction materials to ensure the safety and security of their usage;
ii. provision of quality assurance backstopping by the Supervising Engineer/ consultant; and
iii. response to emergencies.

Measures adopted to manage these concerns include:

i. Monthly Inspections and Damage Control;
ii. Quality Assurance and Security; and
iii. Provisional Emergency Response Action.

Monthly Inspections and Damage Control

The PIU will carry out its monthly inspections with the aim of correcting any defects at every stage of construction.

Quality Assurance

In order to avoid any substandard construction works, all materials/facilities will be pretested to the required standard before approval for installation/ construction.

Housekeeping

A disorderly or dirty workplace can introduce its own hazards in addition to those associated with the construction works. Good housekeeping is the first principle of health, safety and fire prevention. The following measures will be ensured to ensure good housekeeping at the works site:

i. All areas will be kept clear of non-essential equipment and materials;
ii. All equipment will be kept clean and leakages sealed;
iii. Management will ensure that all equipment and materials are in their assigned place and that no loose or unnecessary tools are left lying about in the workplace; and

iv. Caution notices such as "Do Not Litter" will be provided at vantage areas.

7.8 Continued Public Participation

The PIU and the PIU/ Management of the Tinga CMDC will always open its doors to the general public for complaints, suggestions and advice on environmental and social related issues and they will be quickly addressed.

7.9 Emergency Response Action

Responsibility
The proposed emergency response plan for the construction phase is provided. Emergency situations will be managed by the EHS Unit of the Contractor. The EHS Manager or Supervisors can declare an emergency.

Emergency Service Providers and Communication Channels
After declaration of an emergency, the following organizations or emergency service providers will be notified immediately, depending on the type of emergency:

i. GNFS- call 999 or 192
ii. Ghana Police Service -call 18555 or 191
iii. Ghana Ambulance Service- call 112

Emergency services (e.g. fire services, medical services, etc.) can be contacted by phone call, using the contact numbers supra. The EHS Manager or Supervisors can contact emergency services and provide them with all appropriate information. Contact with the emergency services provider must be kept until they arrive on site.

Stakeholder Communication Roles
All information on the emergency to the media and other stakeholders will be sent from one focal person who is the responsible person for emergency coordination. This will be the Pproject Manager or in his absence the EHS Manager.

In case of all emergencies, all workers are to note the following:

- DO NOT CALL the local media to report the emergency (It is the responsibility of the Project Manager and in his absence the EHS Manager)
- DO NOT CALL the family or friends of the persons involved in the emergency (It is the responsibility of the Project Manager and in his absence the EHS Manager)

System for Raising Alarm
Construction workers will be informed and educated on the system for raising alarms at the workplace. Generally, workers are expected to shout at least three times using the nature of the emergency. Example if the emergency is fire, the worker who first sees or observes it will shout FIRE! FIRE! FIRE! If the emergency is an accident, worker will shout ACCIDENT! ACCIDENT! ACCIDENT! If the emergency is spillage, worker should shout SPILLAGE! SPILLAGE! SPILLAGE!. If the emergency occurs offsite, the worker is expected to call the Project Manager or EHS Manager immediately if he/she is able to do so.

Emergency Assembly Point at the Treatment Plant Site
The contractor for the Tinga CMDC site will create an emergency assembly point at the site. The Emergency Assembly Point (EAP) is where all staff and visitors will assemble during the occurrence of an emergency which requires all workers and visitors to be accounted for.

Equipment and Resources
The contractor will ensure that there are adequate equipment and resources as well as appropriate measures in place for its preparedness for an emergency. The equipment/resources and measures to be put in place include:

- Availability of PPEs including safety googles, hand gloves, reflective jackets, raincoats, life jackets, wellington boots/safety shoes;

- Provision of fire extinguishers;
- Availability of equipment/tools (e.g. vehicle, wheel barrows, shovels etc.) for emergencies;
- Creation of an emergency response team;
- Provision of mobile phones to supervisors to enable relevant stakeholders to be promptly informed and reached during emergencies.

Specific Emergency Situations

Fuel will not be stored on site. In the event of accidental spillage of construction materials, a recovery truck will be dispatched to the scene quickly to recover the product. **Table 7-2** provides specific emergency situations envisaged and the response measures proposed, while a general emergency response flow chart has been developed for use as shown in **Figure 7-1.**

Table 7-2: Specific Emergency Situations and Proposed Responses

WORKPLACE FIRES	
Response	**Any discovering fire should shout FIRE! FIRE! FIRE!** Assess fire before contacting GNFS immediately. Isolate fire where possible using appropriate extinguishers. Call the Fire Service emergency number 192 or general emergency line 999 if extinguishers are not helpful Evacuate all items and equipment in danger and ensure workers move to safe place Assist Fire Service if needed to control fire If there are injuries, provide first aid and send victims to nearest clinics/hospital Complete an incident report.
Preventive and control measures	Have strategically placed and properly serviced firefighting equipment especially fire extinguishers at vantage points at the construction at Tinga CMDC site. Remove or protect combustible or flammable materials from heat sources. Suppress and control sparks on site. Suppress and control heat/fire (e.g. no burning or naked fire on or around the site; idling engines should be put off etc.). Routing checking and supervision of works/site.
PERSONAL ACCIDENT/INJURY	
Response	Work to be stopped if accident occurs at work camp/ construction site. Apply first aid. Assess condition of the injured, and contact Tinga CHPS / ambulance if required. Complete accident report.
Prevention and control measures	Well-stocked first aid kits to be maintained. Provide clear signage onsite. Provide appropriate PPEs for workers and ensure its use. Educate and train workers on the use of PPEs and relevance of signages. Evaluate hazards at workplaces. Carry out regular inspection of work activities and workers behaviour
FLOOD	
Response	Where possible move machinery and workers to higher ground.
Prevention and control measures	Monitor weather data and flood warnings for advice. Inspect nearby drains close to the Tinga CMDC especially the main road for any signs of flooding.
SPILL QUARRY DUST, AGGREGATES AND CONCRETE	
Response	Remove remaining quarry dust, aggregates and/ or concrete from spill area. Clean up spillage. Rectify the source of spillage. Complete incident report.
Preventive and control measures	Regularly inspect potential points of spills. Monitor levels of storage of products Do not sweep or hose concrete spillage or aggregates into storm water drains Do not stockpile spill aggregates on roads or walkway/ paths
VEHICLE ACCIDENT	
Response	EHS Manager must be informed immediately by staff available or the driver of the vehicle who will intend report to the Project Manager/ Supervising Engineer Driver or staff on board vehicle should erect reflective triangles at a safe distance in front and behind vehicle The EHS Manager shall visit the scene of the accident, inform and invite the Police to the accident scene or spot. The EHS Manager shall investigate the cause of the accident and submit a report on the incident/ accident. Where casualties are involved, the EHS Manager must ensure they are sent to the nearest clinic or hospital. Complete an accident report

Prevention and control measures	All drivers shall observe the specified speed limits of 20 km/h - 50km/h on the Tinga – Main Mine Pit Site road and 20km/hr to the construction site. All drivers on major roads shall observe a highway speed limit of 60km/h and the mandatory speed limit of 50km/h in communities. Make sure the accident area is safe and be alert for physical dangers such as fires or smoke and if fire is suspected call fire service on 192 immediately. Ensure cars are parked safely and well away from the accident spot. Make vehicles safe by switching off the ignition of all damaged and affected cars Call emergency line 999 or 112 for ambulance service if there are injuries or medical emergencies. Assess the casualties quickly and provide first aid if possible
ELECTRIC SHOCK AND ASSOCIATED INJURIES	
Response	Isolate power line/ power, if safe to do so. If not, use a dry, non-conducting object made of cardboard, plastic or wood to move the source away and from the injured person. Provide injured from shock with first aid and then to nearest clinic/ hospital for medical care or call ambulance on 112 Complete incident report
Prevention and Control Measures	Ensure all electrical power sources and cables are properly insulated Avoid loose hanging wires Never use a damaged extension cord or defective electrical device. Keep wet hands away from electrical outlets. Check and report all electrical hazards. Train employees on electrical safety.

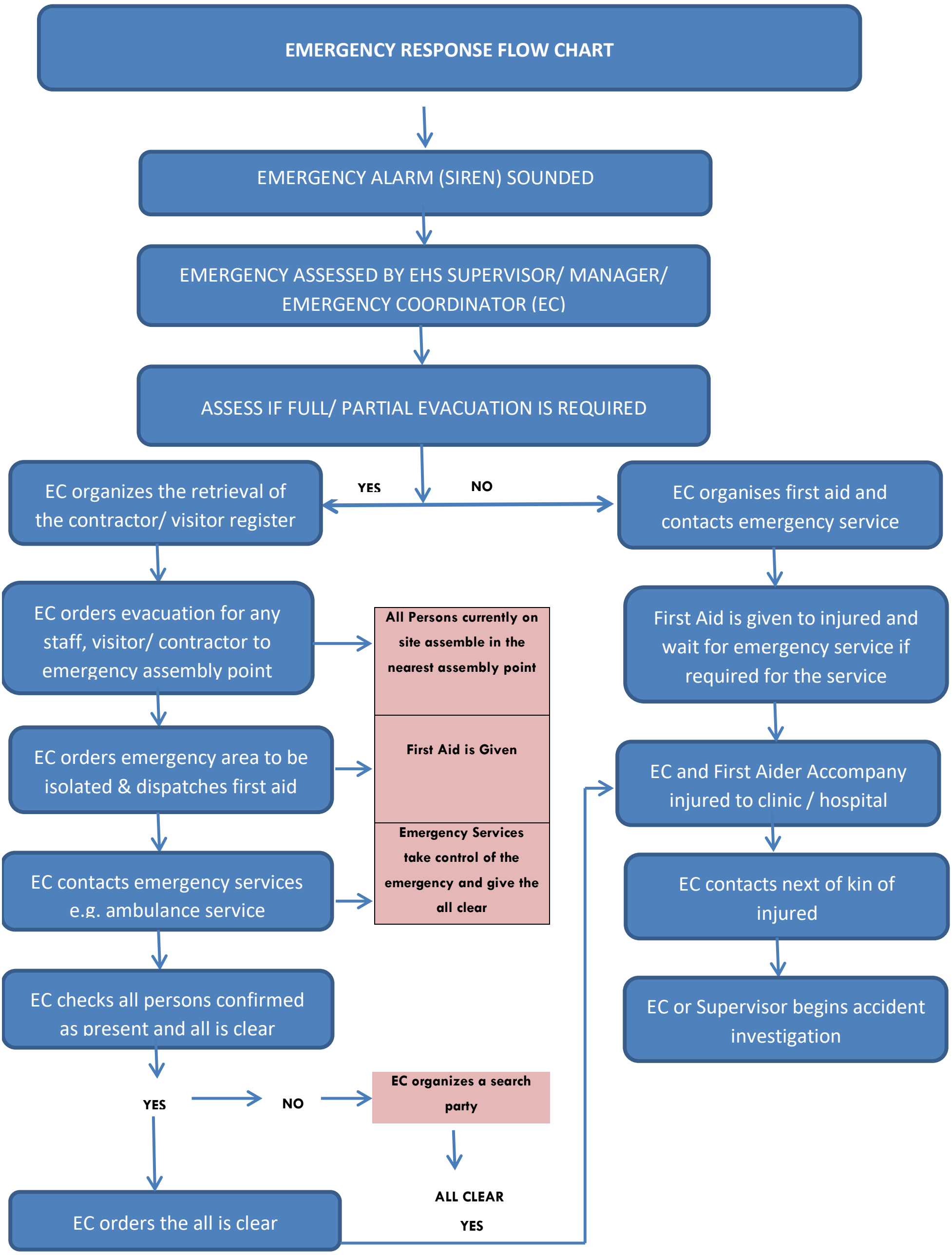


Figure 7-1: Emergency Response Flow Diagram for Managing Emergencies at the Construction Site

7.10 Key Roles and Responsibilities of Major Actors

A summary of the roles and responsibilities of key stakeholders in the implementation of the ESIA/ESMP are provided in **Table 7-3**.

Table 7-3: Key Roles and Responsibilities of Major Actors

#	Key Actor	Key Roles and Responsibilities
1.	Environmental Protection Agency - Regional Office and Head Office	❍ Offering guidance for screening, scoping, review of draft report, receiving comments from stakeholders, public hearing. ❍ Issue environmental permit with a schedule/ conditions to the permit for project implementation ❍ Monitoring of ESA/EMP and compliance with environmental permit schedule/ conditions ❍ Environmental liability investigations ❍ Site visits and follow-ups ❍ Promote environmental awareness
2.	Ministry of Environment, Science Technology and Innovation	❍ Has overall responsibility for the AEHPMP and compliance with the World Bank Safeguards Policies applicable to the project ❍ In conjunction with the EPA/ AEHPMP PIU, Has overall responsibility for successful implementation of the ESMP.
3.	AEHPMP PIU	❍ Liaise closely with the EPA and other regulators to obtain the needed permits and approvals for project implementation. ❍ Disclose the approved ESMP document to the public ❍ Coordinate and ensure the implementation of the project and the environmental/social requirements. ❍ Identify and liaise with all stakeholders involved with the environmental/social related issues of the project. ❍ Establish partnerships and liaise with organizations, stakeholders and civil society groups to ensure successful implementation of the project. ❍ Promote environmental, social, health and safety awareness ❍ Coordinate and present project implementation E&S monitoring report to EPA and World Bank on regular basis.
4.	Minerals Commission	❍ Has overall responsibility for the Community Mining Scheme at Tinga ensuring they have a valid Mining Operating Permit at all times. ❍ Provide a Mining Services Operating Permit for the Tinga CMDC. ❍ Liaise closely with the EPA and other regulators to supervise the operation of the CMDC at Tinga
5.	Contractor	❍ Compliance with BoQ specifications. ❍ Provide their strategies on management of Health and Safety, Waste Management, Traffic Management, Code of Conduct ❍ Engage in grievance redress during project implementation ❍ Implement mitigation/monitoring program captured in the ESIA/ESMP and permit schedules related to the construction phase during project implementation. ❍ Periodically review construction activities and ensure compliance with ESHS regulations and laws. ❍ Prepare and submit relevant ESHS reports to regulatory agencies. ❍ Ensure workplaces are safe and construction workers are provided with appropriate PPEs. ❍ Comply with traffic management plan provisions. ❍ Promote environmental awareness among workers.
6.	Supervising Engineer/ Consultant	❍ Supervise contractor and ensure compliance with BoQ specifications. ❍ Ensure that Contractor and subcontractors comply with their Environmental, Health and Safety plans and monitoring programs. ❍ Review and approve all construction method statements from the contractor
7.	Bole District Assembly	❍ Provide development and building approvals for project buildings and structures. ❍ Provide suggestions and concerns to ensure smooth implementation of the project during stakeholder meetings. ❍ Participate in the EA processes and in the project decision-making that helps prevent or minimize impacts and to mitigate them. ❍ Assist in resolving community complaints or grievances that are beyond the Contractor. ❍ Approve disposal sites for construction wastes and other wastes generated during the construction phase.

#	Key Actor	Key Roles and Responsibilities
8.	Community opinion leaders, Assembly member Residents, including Miners	❍ Partnering in project stakeholders' awareness creation ❍ Support the project implementation and follow due process in addressing grievances and complaints. ❍ Reporting grievances through the established GRM structures for the project ❍ Provide comments, advice and/or complaints on issues of nonconformity. ❍ Attend public meetings organized for stakeholders on Environmental and Social Safeguards. ❍ Provide feedback to Contractor/ AEHPMP PIU on complaints from locals on construction activities creating environmental/social nuisance or problems to the community or individuals in the community.
9.	NGOs/CSOs	❍ Promote ESHS awareness ❍ Provide feedback to AEHPMP PIU on complaints from locals on construction activities creating ESHS nuisance or problems to the community or individuals in the community. ❍ Publicize GRM arrangements for the project. ❍ Act as an environmental/social mobilizer and mediator when required.
10.	World Bank	❍ Provide adequate funding for the project implementation. ❍ Overall supervision and provision of technical support and guidance. ❍ Recommend additional measures for strengthening the management framework and implementation performance.
11.	Media	❍ Publicize or discuss the project information approved by AEHPMP PIU ❍ Identify issues that could derail the project implementation and bring them to the attention of stakeholders. ❍ Promote environmental and safety awareness on the project.
12.	Ghana National Fire Service GNFS)	❍ Be involved with emergency response situations that is beyond the capability of the Contractor.
13.	Ghana Police Service	❍ Be involved with any violations of national laws and order, GBV/ SEA/ SH and human right abuses by construction personnel and community members.
14.	Medical facilities	❍ Help in treating accident victims with major injuries that occur onsite or offsite involving either construction personnel or community members during the implementation of the project.

7.11 Grievance Redress Mechanism

7.11.1 Basis of Grievance Redress Mechanism

Even though during this ESMP preparation processes, stakeholder consultation was carried out in a consultative and participatory manner, experience has shown that grievances are further raised sometimes by project-affected persons/ I&APs during the project implementation. In the light of this, grievance resolution procedures for projects are necessary to resolve disputes that may arise from an aggrieved person.

A Grievance Redress Mechanism (GRM) is a system by which queries or clarifications or problems that arise out of implementation of a project are resolved and addressed efficiently and effectively. When addressed, the grievances are expected to ensure support, as well as help achieve results and sustainability of project activities.

As part of this ESMP, a GRM with multiple avenues or channels for lodging complaints and their resolution in a way that is transparent, prompt and timely and with clear procedures is established hereunder. The establishment of the GRM on all the AEHPMP projects is a requirement by the World Bank to ensure resolution of project related conflicts or complaints.

7.11.2 Objectives of the Grievance Redress Mechanism

The objectives of the Grievance Redress Mechanism among others is to:

- Resolve grievances or complaints from affected persons, groups and institutions promptly, fairly and in a manner, that to extent possible acceptable to all parties;
- Provide affected people with avenues for making a complaint or resolving any dispute that may arise during the implementation of the project;
- Ensure that appropriate and mutually acceptable redress actions are identified and implemented to the satisfaction of complainants; and
- Avoid the need to resort to judicial proceedings.

7.11.3 The Grievance Redress Structure

The grievance redress structures uses the already existing EPA Grievance Redress framework to address complaints that may arise as a result of the proposed construction of the Tinga CMDC (Grievance Redress Mechanism (GRM) | Environmental Protection Agency, Ghana (epa.gov.gh).

The Safeguards Specialist or a dedicated staff at the PIU would be responsible for management the central Grievance Redress System relating to the Tinga CMDC project of AEHPMP. The proposed GRM recommends four key steps as follows:

- Receive and register grievances or complaints;
- Acknowledge, assess and assign (Acknowledge receipt of grievance, outline how grievance will be processed, assess eligibility and assign responsibility);
- Propose Response; and
- Agreement on Response.

If agreement is reached, implement agreement. If agreement is not reached, review case and if no agreement is reached under the review process, then the case can be referred to the law courts.

7.11.4 Steps of the Grievance Process

Table 7-4 presents the recommended time frames for addressing a grievance or dispute.

Table 7-4: Proposed GRM Time Frame

Step	Process	Timeframe
1	Receive and register grievance	Within 24 hours
2	Acknowledge the grievance	Within 24 hours
3	Assess the grievance	Within 24 hours
4	Assign responsibility	Within 2 Days
5	Develop a response	Within 7 Days
6	Implement response if agreement is reached	Within 7 Days
7	Close the grievance	Within 2 Days
8	Initiate grievance review process if no agreement is reached at the first instance	Within 7 Days
9	Implement review recommendations and close grievance	Within 14 Days
10	Grievance taken to court by complainant if no agreement is reached	-

7.11.5 Grievance Documentation and Reporting

Resolved and escalated grievances/cases would be documented daily (as tickets) into the EPA centralized GRM system by the assigned grievance Officer. The Safeguards Specialist or a dedicated staff at the PIU would exercise oversight over the system and track the resolution of all grievances/cases.

Monthly case/ grievance reports will be generated from the system by the Safeguards Specialist or a dedicated staff at the PIU and report to the Project Coordinator to inform management decisions. Quarterly reports would also be generated and reported to the MESTI as part of the Project's Progress Reporting to the World Bank. Periodic reports will also be generated within a reasonable time frame for stakeholders upon request irrespective of the period (e.g. bi-annual, annual etc.).

8.0 INSTITUTIONAL CAPACITY REQUIREMENTS FOR ESMP IMPLEMENTATION

To effectively implement this ESMP document, training will be undertaken by the AEHPMP PIU to equip key stakeholders who will be involved in the implementation, monitoring, and reporting on the ESMP. The capacity building will be carried out prior to the commencement of the civil works and subsequently prior to operations. The training is aimed at providing knowledge and understanding on the ESMP requirements, the skills required, and the roles and responsibilities. A proposed plan for the capacity building is presented in **Table 8-1**. The Plan is estimated to cost Seven Hundred and Fifty Thousand Ghana Cedis (GHS750,000.00).

Table 8-1: Training Plan for the ESMP Implementation

Training Required	Targeted Participants	Duration	When	Estimated training cost (GHS)
Overview of World Bank and EPA Policies triggered by the Project.	**Contractor Key Staff**-Project Engineer, Foreman, Safeguards Officer, Clerk of Works, Health and Safety Manager. **Supervising Consultant staff-** Project Engineer, Safeguards Officer, Clerk of Works. **Bole District Assembly**- District Chief Executive, Metropolitan Coordinating Officer, Metropolitan Planning Officer Metropolitan Social Development & Gender Officer, Waste Management Engineers, Metropolitan Works Engineer, Elected Assembly member of the project community	1 day	Prior to commencement of civil works	150,000.00
Overview of the ESMP, Potential E&S impacts, Mitigation and management measures, E&S monitoring, Roles and Responsibilities	**Contractor Key Staff**-Project Engineer, Foreman, Safeguards Officer, Clerk of Works, Health and Safety Manager. **Supervising Consultant staff-** Project Engineer, Safeguards Officer, Clerk of Works. **Bole District Assembly** - District Chief Executive, Metropolitan Coordinating Officer, Metropolitan Planning Officer, Metropolitan Social Development & Gender Officer, Waste Management Engineers, Metropolitan Works Engineer, Elected Assembly member of the project communities **Other Stakeholders**- Community Opinion Leaders/NGOs/CBOs/ Project Affected Persons, Miners and other stakeholders.		Prior to commencement of civil works	150,000.00
Health and Safety (Occupational & Public Health & Safety)	**Contractor Key Staff**-Project Engineer, Foreman, Safeguards Officer, Clerk of Works, Health and Safety Manager, other construction workers. **Supervising Consultant staff-** Project Engineer, Safeguards Officer, Clerk of Works. **Bole District Assembly**- District Planning Officer, Metropolitan Social Development & Gender Officer, Waste Management Engineers, Metropolitan Works Engineer, Elected Assembly member of the Tinga community **Other Stakeholders**- Community Opinion Leaders/NGOs/CBOs/ Project Affected Persons, Miners and other stakeholders.	1 day	Prior to commencement of civil works	150,000.00
Code of Conduct for construction workers (integrating GBV and Child labor issues)	**Contractor Key Staff**-Project Engineer, Foreman, Safeguards Officer, Clerk of Works, Health and Safety Manager, other construction workers. **Supervising Consultant staff-** Project Engineer, Safeguards Officer, Clerk of Works. **Other Stakeholders**-Representatives of Community Opinion Leaders/NGOs/CBOs/ Project Affected Persons, Miners and other stakeholders **Bole District Assembly** District Planning Officer, Metropolitan Social Development & Gender Officer, Waste Management Engineers,	½ day	Prior to commencement of civil works & during construction period	75,000.00

Training Required	Targeted Participants	Duration	When	Estimated training cost (GHS)
	Metropolitan Works Engineer, Elected Assemblymember of the project communities			
Construction Waste Management	**Contractor Key Staff**-Project Engineer, Foreman, Safeguards Officer, Clerk of Works, Health and Safety Manager, other construction workers. **Supervising Consultant staff-** Project Engineer, Safeguards Officer, Clerk of Works. **Bole District Assembly**- District Planning Officer, District Social Development & Gender Officer, Waste Management Engineers, Metropolitan Works Engineer, Elected Assemblymembers of the project communities	½ day	Prior to commencement of civil works & during construction period.	75,000.00
Grievance Redress Mechanisms	**Contractor Key Staff**-Project Engineer, Foreman, Safeguards Officer, Clerk of Works, Health and Safety Manager. **Supervising Consultant staff-** Project Engineer, Safeguards Officer, Clerk of Works. **Bole District Assembly**- District Coordinating Officer, Metropolitan Planning Officer, Metropolitan Social Development & Gender Officer, Waste Management Engineers, Metropolitan Works Engineer, Elected Assemblymembers of the project communities **Grievance Redress Committee Members:** **Other Stakeholders**-Representatives of Community Opinion Leaders/NGOs/CBOs/ Project Affected Persons, Miners and other stakeholders	1 day	Prior to commencement of civil works	150,000.00
Subtotal (construction)				**750,000.00**
ESMP Implementation for Operational Phase	**Staff of Tinga CMDC**-4 management team. **Management of Tinga Community Mining Scheme-** 4 staff. **Bole District Assembly** **Grievance Redress Committee Members:** **Other Stakeholders**-Representatives of Community Opinion Leaders/NGOs/CBOs/ Project Affected Persons, Miners and other stakeholders	1 day	During Operations and Maintenance Phase	180,000.00
Requirements of Ghana EPA	**Staff of Tinga CMDC**-representatives of management team. **Management of Tinga Community Mining Scheme-** 4 staff	1 day but twice in a year	During Operations and Maintenance Phase	120,000.00
Hazardous Materials/ Chemicals Management	**Staff of Tinga Mine CMDC**-4 management team. **Management of Tinga Community Mining Scheme -** 4 staff	1 day but twice in a year	During Operations and Maintenance Phase	120,000.00
Subtotal (operation)				**420,000.00**
Grand Total				**1,170,000.00**

9.0 DECOMMISSIONING PLAN

9.1 Post-Construction Phase

9.1.1 Equipment and other Site Facilities

The Contractor will dismantle and relocate all equipment and other facilities and leftover materials such as pieces of wood, iron rods, spent concrete and chipping, broken manholes, scrap metals, debris, obsolete construction equipment, etc., at the project sites upon completion of the construction works. Besides wastes that can be given out or sold out for reuse or recycling, all other wastes generated will be disposed of at the community's approved waste disposal site after the decommissioning.

Decommissioning of the equipment and other facilities will take into consideration the intended use and in compliance with both Ghanaian and international policies governing decommissioning of such facilities.

Guidelines to help in decommissioning any site office and other project installations are presented in **Table 9-1**.

Table 9-1: Guidelines for Decommissioning Site Offices and other Installations

ITEM	DECOMMISSION ACTIVITY	SAFETY MEASURE	MATERIALS REQUIRED
Superstructures			
Pieces of wood, iron rods, metal scraps, corrugated iron sheets, etc.	Reuse or sold/given out to accredited recycling providers	PPE for workers, including leather gloves (potential for the sheets to injure the handler).	Claw hammer
Plastic Sheets	Plastic sheets that will be re-used should be removed and washed with disinfectant, dried and stored safely. Other sheets that will not be reused should be disposed of properly at the community's approved dumpsite.	Workers should be allowed to work only after wearing their PPE. Ensure that after cleaning, the workers shall take a bath and wash themselves with disinfectant and bathing soap	Disinfectant, Chlorine solution, Brushes, Bathing Soap, PPE's for workers (Gloves, reflective Overall, Safety boots, Head cover).
Timber	The timber should be sprayed with disinfectant for reuse. Those not reusable should be donated to local community members for use as firewood.	PPE for workers, including leather gloves (potential for the sheets to injure the handler).	Claw hammer, Digging bar, Spraying equipment and Disinfectant
Sanitation facilities			
Squatting pan and trap or WC, PVC sewage piping	Care should be taken when handling these items as they have been in direct contact with human excreta. If planned for re-use, the pan, trap & PVC items will be removed and wash with disinfectant, to be dried and stored safely; Wastewater should be discharged into an approved disposal site at Tinga.	Workers should be allowed to work only after wearing their PPE. Ensure that after cleaning the workers will take a bath and wash themselves with disinfectant and bathing soap.	Disinfectant, Chlorine solution, Brushes, Bathing Soap, PPE for workers (Gloves, reflective Overall, Safety boots, Head cover).
Masonry Foundations (cement/rings platform)	All above ground structure should be demolished (smashed)	Workers should be allowed to work only after wearing their PPE (and ensuring that the workers take a bath and wash with disinfectant and bathing soap.	Shovels, Pick axe, PPE for workers (Gloves, Overall, Safety boots, Head cover)
Mobile Toilets			
Mobile toilet/urinal units	Care should be taken when handling these items as they have been in direct contact with human wastes. Relocate all mobile toilet/units to new work sites or to contractor yard for future use at new sites.	Workers should be allowed to work only after wearing their PPE.	Disinfectant, Chlorine solution, Brushes, Bathing Soap, PPE for workers (Gloves, reflective Overall, Safety boots, Head cover).
Pit Latrine			

ITEM	DECOMMISSION ACTIVITY	SAFETY MEASURE	MATERIALS REQUIRED
Pit Latrine/urinal units	The pit should be covered with soil material and levelling it up and the area disinfected. Wooden slabs should be buried if applicable.	Workers should be allowed to work only after wearing their PPE.	Disinfectant, Chlorine solution, Pick axes, shovel, wheelbarrow Bathing Soap, PPE for workers (Gloves, reflective Overall, Safety boots, Head cover).
Bathroom			
Washroom and bathing place	The plastic sheet and wooden structures to be broken. Concrete platform to be smashed and the debris moved to a disposal site	Ensure that working crew move the debris to a disposal site	Shovels, Pick axe, wheelbarrow locally available

9.1.2 Project Equipment/Machinery and Materials

The project equipment such as excavators, generators, vehicles and other machinery will be relocated to new or other work sites in the country. Any leftover materials like sand, chippings will be removed from the site.

9.2 Post-Operational Phase – Project Facilities

The Contractor is expected to handover the project facilities to the PIU after construction for operation of the Tinga CMDC. The PIU and other stakeholders will ensure that CMDC last for the period it has been designed for and even beyond. The CMDC will not be decommissioned entirely after the designed period but rehabilitation and expansion works will be carried out as appropriate for further improvement using modern and appropriate technologies.

Any such large-scale rehabilitation and improvement works to be carried out in the long term will be undertaken in line with the environmental assessment procedures of the country. The intended rehabilitation and improvement works will be registered with the EPA to enable the Agency advise on the level of environmental assessment and reporting to be carried out in accordance with the Environmental Assessment Regulations 1999, LI 1652.

Other stakeholders and relevant institutions will be informed prior to the commencement of any major rehabilitation work on the Tinga CMDC, and these include:

- Bole District Assembly – Local government authority in charge of developmental projects in the project area;
- Minerals Commission – Government Agency responsible for the mining sector; and
- PIU – responsible for implementation of the project at Tinga.

10.0 CONCLUSION

The intervention, a community-focused cleaner technology seeks to address current policy challenges as well as to strengthen regulatory frameworks and facilitate their implementation, to better address environmental health risks associated with mercury use in ASGM sector.

The proposed establishment of a CMDC at Tinga is to assist in eliminating mercury exposure and use in ASGM and improve the health risks and effects associated with mercury in the community and Ghana as a whole. Mercury is a known neurotoxin with high exposures linked to some health challenges including kidney and autoimmune dysfunction.

The various stages in the existing Tinga ASGM activities have some environmental and social risks and impacts, which the proposed CMDC seeks to address, which also has some impacts albeit minor. This ESMP therefore seeks to provide mitigation and management measures to realize the benefits from the intervention while eliminating any cumulative impacts.

The overall strategy for the intervention is designed to improve ASGM operations in mining communities such as Tinga. While eliminating the health risks associated with mercury, use in ASGMs the main benefit of the intervention other multiplier effects such as employment opportunities, poverty reduction and improved national reputation, some negative impacts during implementation have been identified during construction and operation of the ASGM sector. Such negative impacts include air quality deterioration, noise level elevation and landscape destruction during construction and wastewater generation during operation and maintenance which have been identified as minor.

The studies towards the preparation of this ESMP has revealed that the execution of the CMDC at Tinga will not severely impact negatively on the existing environmental, social, safety and health of the community.

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12.0 LIST OF ANNEXES

Annex 3-1: Report of Ambient Air Quality Noise Assessment Study
Annex 3-2: Report of Terrestrial Ecology Study
Annex 4-1: Stakeholder Engagement Results
Annex 7-1: Sample Code of Conduct Forms

Annex 3-1: Report of Ambient Air Quality Noise Assessment Study

ENVIRONMENTAL PROTECTION AGENCY (EPA)

GHANA, AFRICA ENVIRONMENTAL HEALTH AND POLLUTION MANAGEMENT PROGRAMME (AEHPMP)

AMBIENT AIR AND NOISE LEVELS BASELINE STUDY REPORT

FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP), FOR TINGA MINE SITE

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Table of Contents

❑ List of Tables

❑ List of Figures

❑ List of Plates

❑ EXECUTIVE SUMMARY

The Environmental Protection Agency (EPA) has proposed to establish a Clean Mine Demonstration Centre (CMDC) at the Tinga Mine in the Bole area of the Savannah Region of Ghana as part of the Africa Environment Health and Pollution Management Programme (AEHPMP) funded by the World Bank. The centre will be supplied with ore from the Tinga Mine within the Jurisdiction of the Bole District Assembly (BDA).

The establishment of the CMDC at the Tinga Mine requires the preparation of an Environmental and Social Management Plan (ESMP). This report of the ambient air quality, and noise levels baseline characteristics of the catchment area of the proposed establishment of a CMDC at Tinga Mine forms part of the baseline studies for the ESMP preparation. It describes the baseline ambient concentration of particulate matter, and noxious gases at specified locations around the Tinga Mine catchment. The monitoring was carried out by Messrs E**nvirorich Consult Limited** on 1st August, 2024. The samples were collected from the following locations described hereunder with their respective Global Positioning System (GPS).

For Ambient Air and Noise

ID	**Sampling Site**	**Coordinates**
AN1	The Main Pit Site	08°33'51.0"N, 002°09'13.4"W
AN2	Demarcated Plant Site	08°33'56.31"N, 002°09'24.91"W
AN3	Alternative Plant Site	08°34'17.2"N, 002°10'19.9"W

The concession for the community mining falls within the Tropical continental or savanna climatic region of Ghana characterised by a distinct wet and dry seasons where rainfall occurs during a particular period during the year (the wet season). During this time, these areas are under the influence of the ITCZ. It lies within the tropical grassland or savanna vegetative zone of Ghana where the dry season is clearly marked. High temperatures are also experience at this climatic region throughout the year.

The purpose of the assignment was to monitor and confirm the baseline concentration of particulate matter, noxious gases, and noise levels of the project area/ concession as part of the ESMPs study and depicting the baseline conditions. The scope of work involved (1) fieldwork, (2) data analysis and (3) report preparation.

for ambient air quality- (monitored 1st August, 2024)

ID	Sampling Site	TSP/ μgm^{-3}	PM_{10}/ μgm^{-3}	$PM_{2.5}$/ μgm^{-3}	NO_2/ μgm^{-3}	SO_2/ μgm^{-3}
AN1	The Main Pit Site	103.9	50.1	10.3	1.232	21.390
AN2	Demarcated CMDC Site	35.7	18.3	5.6	1.490	14.722
AN3	Alternative CMDC Site	36.2	17.1	4.8	0.520	11.141
GS 1236:2019- Ambient Air Pollutants		**150.0***	**70.0***	**35.0***	**150.0***	**50.0***
WHO Guideline Value		**na**	**50.0***	**25.0***	**200.0***	**50.0***
WBG Guideline Value		**na**	**50.0***	**25.0***	**200.0****	**20.0***

*…….24 hours averaging time **……..1 hour averaging time

GS 1236:2019 is "Environment and Health Protection- Requirements for Ambient Air Quality and Point Source/ Stack Emissions"

for noise levels- (monitored 1st August, 2024)- measurements done in line with GS 1253:2018

ID	Sampling Site	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
AN1	The Main Pit Site	63.2	70.5	53.4	67.1	60.0	55.5
AN2	Demarcated CMDC Site	46.0	57.6	39.6	47.9	45.1	42.5
AN3	Alternative CMDC Site	45.8	58.1	37.9	46.7	44.5	41.3
GS 1222:2018 (Mixed Use)		**60.0**					
WHO Guideline Value (Industrial, Commercial Shopping and Traffic Areas, Indoors and Outdoors)		**70.0**					
WBG Guideline Value (Industrial, Commercial)		**70.0**					

Legend

L_{EQ} Equivalent Sound Level representing the average integrated sound level accumulated during the sampling period
L_{MAX} Maximum Sound Level obtained during the sampling period
L_{MIN} Minimum Sound Level obtained during the sampling period
L_{10} Nuisance noise level during the sampling period
L_{50} Average noise level recorded during the sampling period
L_{90} Background noise level recorded during the sampling period
GS 1222:2018 is "Health Protection- Requirements for Ambient Noise Control"
GS 1253:2018 is "Acoustic- Guide for Measurement of Outdoor A-Weighted Sound Levels"

The results show that:

For Dust/ Noxious Gases

- Dust levels in the ambient air ranged from 35.7µgm-^{3} at the Demarcated CMDC Site to 103.9µgm-^{3} at the Main Pit Site for TSP compared with the GS value of 150µgm-3 and from 17.1µgm-^{3} at the Alternative CMDC Site to 50.1µgm-^{3} at the Main Pit Site for PM10 compared with the GS value of 70µgm-^{3}. PM2.5 values ranged from 4.8µgm-^{3} at the Alternative CMDC Site to 10.3µgm-^{3} at the Main Pit Site.
- Noxious gases emission was within the respective GS values. SO_2 was 11.141µgm-^{3} at the Alternative CMDC Site to 21.390µgm-^{3} at the Main Pit Site compared with the GS value of 50.0µgm-^{3}, while NO_2 ranged from 0.520µgm-^{3} at the Alternative CMDC Site to 1.490µgm-^{3} at the Demarcated CMDC Site, compared with the GS value of 150.0µgm-^{3}. However, SO_2 was in excess of the WBG Guideline value of 20µgm-^{3} at the Main Pit Site.
- PM10 for the Main Pit Site was in excess of the WHO and WBG Guideline value of 50µgm-^{3} respectively, which may be attributable to the blasting and the movement of motor bikes and tricycles on the dusty road at the Main Pit Site. All the other parameters showed values below the respective WBG and WHO guideline values.
- The prevailing wind direction was from South-West to North-East.

The following recommendations are therefore made:

- The ambient air quality should be sustained even during construction or operation and maintenance phase of the mine.

For Noise

- Equivalent Noise Levels (Leq) ranged from 45.8dB(A) at the Alternative CMDC Site to 63.2dB(A) at the Main Pit Site compared with the GS value of 60dB(A) for a mixed use Area and 70dB(A) for WHO Guideline Value (Industrial, Commercial Shopping and Traffic Areas, Indoors and Outdoors) and WBG Guideline Value (Industrial, Commercial).
- The Lmax values recorded ranged from 57.6dB(A) at the Demarcated CMDC Site to 70.5dB(A) at the Main Pit Site.

The following recommendation is therefore made:

- The serene environment in the towns/ villages/ hamlets within the project area should be maintained during construction and mining.

1. INTRODUCTION

1.1 Background

As part of the Preparation of Environmental and Social Management Plans (ESMPs), Ore Characterization and Reserve Estimation for Selected Clean Mine Pilot Sites, air quality and noise monitoring exercise has been carried out by Messrs **Envirorich Consult Limited** for the Tinga Mine Site to determine the baseline conditions of air, and noise level of the proposed project area. The report of the assignment is presented hereunder.

1.2 Environmental Quality Standard Values

The Ghana Standards Authority (GSA) has in collaboration with the Environmental Protection Agency (EPA) and through various National Technical Committees issued Ghana Standard (GS) requirements for Ambient Air Quality, Noise Control and the relevant standard values are as presented in **Table 1** and **Table 2** respectively.

Table 2: Maximum Limits of Ambient Air Pollutants- GS1236:2019

NO.	SUBSTANCE	TIME WIGHTED AVERAGE, (TWA)	AVERAGING TIME
1.	Sulphur Dioxide (SO_2)	*520* μgm^{-3} 50 μgm^{-3}	*1hr* 24hrs
2.	Nitrogen Oxides (measured as NO_2)	*250* μgm^{-3} 150 μgm^{-3}	*1hr* 24hrs
3.	Total Suspended Particulate (TSP/SPM)	*150* μgm^{-3} 80 μgm^{-3}	*24hrs* 1yr
4.	PM_{10}	*70* μgm^{-3} 70 μgm^{-3}	*24hrs* 1yr
5.	$PM_{2.5}$	*35* μgm^{-3}	*24hrs*
6.	Carbon Monoxide (CO)*	*100 mg/m³* 60 mg/m³ 30 mg/m³ 10 mg/m³	*15mins* 30mins 1hr 8hrs

(Source: GSA, 2019) **.....Fenceline Air Pollutant Standard*

Table 3: Requirements for Ambient Noise Control Level Based on Categorized Zones- GS 1222:2018

ZONE	DESCRIPTION OF AREA OF NOISE RECEPTION	PERMISSIBLE NOISE LEVEL IN dB(A)	
		DAY 0600 - 2200	NIGHT 2200 - 0600
A	Residential areas	*55*	48
B	Educational and health facilities, office and law courts	*55*	50
C	Mixed Use	60	*55*
D	Areas with some light industry	*65*	60
E	Commercial areas	*75*	*65*
F	Light industrial areas	70	60
G	Predominantly heavy industrial areas	70	70
Ensure that maximum noise level near the construction site does not exceed 66dB(A) in other areas and 75dB(A) in an industrial area			

(Source: GSA, 2018)

1.3 Objective

The purpose of the assignment was to monitor the environmental media to confirm the baseline concentration of particulate matter, noxious gases, and noise levels of the project area as part of the ESMPs study.

1.4 Scope of Work

The scope of work included the following among others:

- Monitoring of ambient air quality parameters involving the following at the selected points within the project area and environs viz: (i) Sulphur Dioxide (SO_2), (ii) Nitrogen Dioxide (NO_2), (iii) Total Suspended Particulate (TSP), and (iv) Respirable Dust ($PM_{2.5}$ & PM_{10}),
- Noise level assessment at the selected points within the concession;
- Climatic assessment;
- Analysis of data; and
- Report preparation.

2. WORK CARRIED OUT

The monitoring exercise was carried out by a three- man team on 1st August 2024 at the specified locations in the proposed project area. The Community people provided support.

2.1 Monitoring Locations

The samples were collected from the following sampling/ monitoring points, and analysed for specified parameters as shown in **Tables 3** for Ambient Air Quality and Noise. **Figure 1** is a map showing the air quality, and noise levels monitoring locations.

Table 4: Ambient Air and Noise Monitoring Location

ID	Sampling Site	Coordinates
AN1	The Main Pit Site	08°33'51.0"N, 002°09'13.4"W
AN2	Demarcated CMDC Site	08°33'56.31"N, 002°09'24.91"W
AN3	Alternative CMDC Site	08°34'17.2"N, 002°10'19.9"W

The monitoring points were so chosen to ensure coverage of the baseline conditions in the concession.

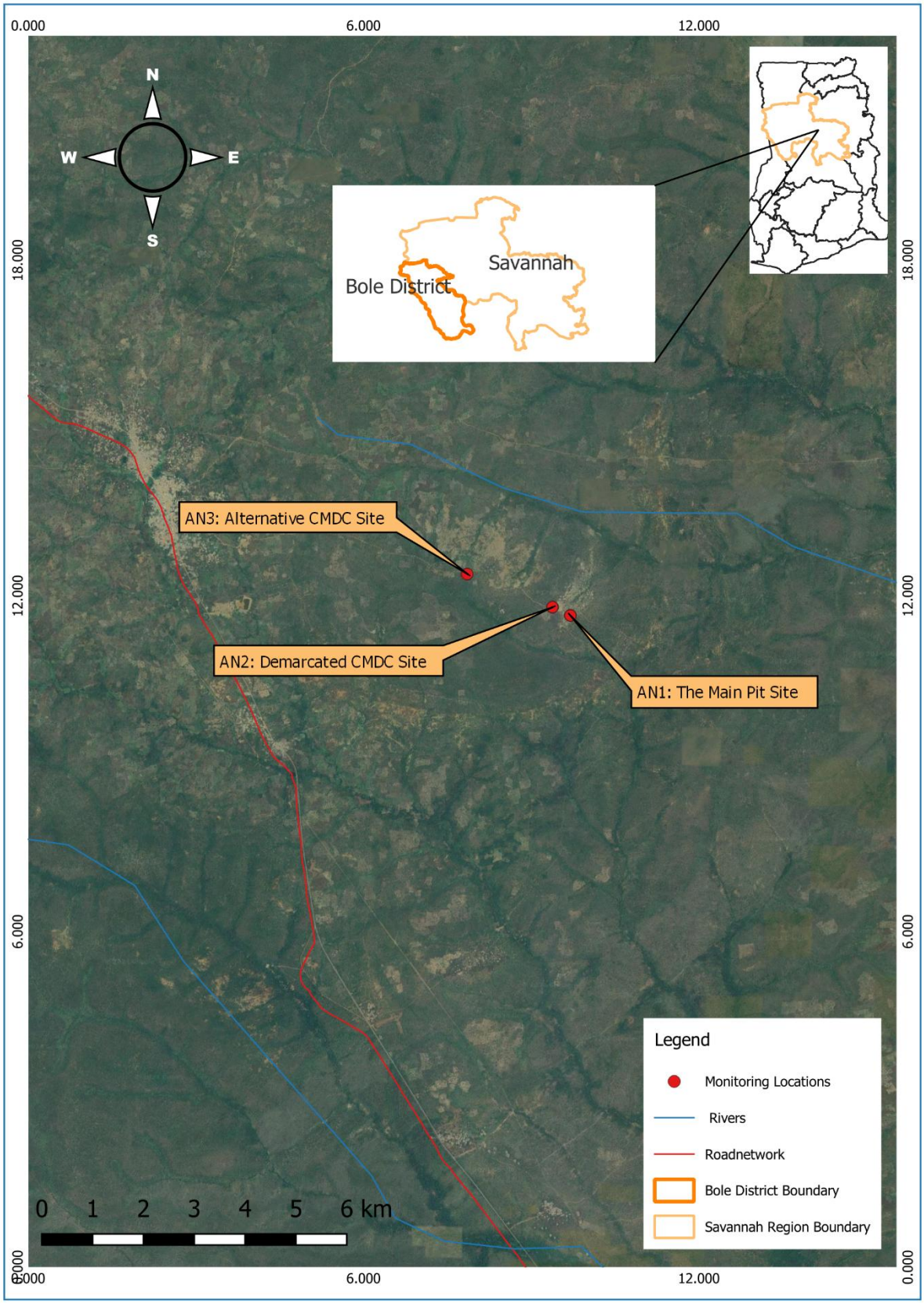

Figure 2: Ambient Air, and Noise Monitoring Locations in the Project Area and Environ

2.2 Methodology

2.2.1 Particulate Matter and Noxious Gases Measurement

The ambient air quality was monitored for concentrations of Total Suspended Particulates (TSP), Respirable Dust ($PM_{2.5}$ PM_{10}), Sulphur Dioxide (SO_2), and Nitrogen Dioxides (NO_2), at the designated sampling locations as well as the noise level.

Particulate Matter

The Osiris, a Turnkey Instrument's direct reading airborne particulates monitor was used to measure the concentrations of the TSP, PM_{10} and $PM_{2.5}$ in the ambient air. The Osiris particulates monitor is time-integrated and configured to measure the particulates mentioned above in real time, and provides the time-weighted average values over the monitoring period- 24- hour averaging time. It works by using Turnkey's specially-developed nephelometer i.e., air samples are continuously drawn through the nephelometer, which analyses individual particles as they pass through a laser beam. The particles are then collected on the reference filter. The Osiris has achieved the Environment Agency's MCERTS certification, ensuring its accuracy in recording data. **Plate 1** shows the Osiris mounted at the site of the points monitored.

Plate 2: The Osiris Particulates Monitor at Location AN1 (Mining Site)

Noxious Gases

Levels of sulphur dioxide, nitrogen dioxide and carbon monoxide in the ambient air at different sampling locations in the site was determined using the Aeroqual Series 500 gas monitor with sensor heads of the required noxious gas as shown in **Plate 2.** It enables real time monitoring of

the particular gas and provides the time-weighted average values over the monitoring period- 24- hour averaging time at the points monitored.

Plate 3: The Aeroqual Series 500 Gas Monitoring Deployed at AN1 (Mining Site)

2.2.2 Noise Assessment

Noise Levels were captured in-situ in decibels on the A scale, i.e. dB(A) using a portable Pulsar Integrated Sound Level Meter with data logging system. Measurement of noise is often 'A-weighted' to take into account the fact that some sound wavelengths are perceived as being particularly loud and not sensitive to the human ear. Thus the A scale gives greater weight to the frequencies of sound to which the human ear is most sensitive.

Noise levels were measured for a period of time and the data logged into the equipment memory. The statistical summaries were later retrieved for analysis (**See Plate 3**).

Plate 4: The Noise Monitor Positioned at AN2 (Demarcated Plant Site)

- ***2.3 Analysis of Data***

Direct comparison with the GS values for the various emissions was employed.

Particulate Matter/ Noxious Gases

Air quality and meteorological data were analysed and compared with the GS values and the possible areas of impact respectively.

Noise

The following statistical summaries were automatically retrieved from the sound level meter and are as explained below and compared with the GS value for Predominantly Commercial Areas:

- L_{EQ} Equivalent Sound Level representing the average integrated sound level accumulated during the sampling period;
- L_{MAX} Maximum Sound Level obtained during the sampling period;
- L_{MIN} Minimum Sound Level obtained during the sampling period;
- L_{10} Nuisance noise level obtained during the sampling period;
- L_{50} Average noise level recorded during the sampling period; and
- L_{90} Background noise level recorded during the sampling period.

- ***2.4 Calibration of Equipment***

All equipment used for the exercise were calibrated at the laboratory prior to carrying out the assignment using Standard Operating Procedures (SOPs).

3. RESULTS AND DISCUSSIONS

3.1 Results

3.1.1 Ambient Air Quality Results

The results of the air quality monitoring exercise are as shown in **Table 4.**

Table 5: Ambient Air Quality Results - (monitored 1st August, 2024)

ID	Sampling Site	TSP/ µgm^{-3}	PM_{10}/ µgm^{-3}	$PM_{2.5}$/ µgm^{-3}	NO_2/ µgm^{-3}	SO_2/ µgm^{-3}
AN1	The Main Pit Site	103.9	50.1	10.3	1.232	21.390
AN2	Demarcated CMDC Site	35.7	18.3	5.6	1.490	14.722
AN3	Alternative CMDC Site	36.2	17.1	4.8	0.52	11.141
GS 1236:2019- Ambient Air Pollutants		**150.0***	**70.0***	**35.0***	**150.0***	**50.0***
WHO Guideline Value		**na**	**50.0***	**25.0***	**200.0***	**50.0***
WBG Guideline Value		**na**	**50.0***	**25.0***	**200.0****	**20.0***

*…….24 hours averaging time **……..1 hour averaging time

GS 1236:2019 is "Environment and Health Protection- Requirements for Ambient Air Quality and Point Source/ Stack Emissions"

3.1.2 Noise Level Results

The results of the noise monitoring exercise are as shown in **Tables 5.**

Table 6: Noise - (Monitored 1st August, 2024) – measurements done in line with GS 1253:2018

ID	Sampling Site	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
AN1	The Main Pit Site	63.2	70.5	53.4	67.1	60.0	55.5
AN2	Demarcated CMDC Site	46.0	57.6	39.6	47.9	45.1	42.5
AN3	Alternative CMDC Site	45.8	58.1	37.9	46.7	44.5	41.3
GS 1222:2018 (Mixed Use)		**60.0**					
WHO Guideline Value (Industrial, Commercial Shopping and Traffic Areas, Indoors and Outdoors)		**70.0**					
WBG Guideline Value (Industrial, Commercial)		**70.0**					

Legend

L_{EQ} Equivalent Sound Level representing the average integrated sound level accumulated during the sampling period

L_{MAX} Maximum Sound Level obtained during the sampling period

L_{MIN} Minimum Sound Level obtained during the sampling period

L_{10} Nuisance noise level during the sampling period

L_{50} Average noise level recorded during the sampling period

L_{90} Background noise level recorded during the sampling period

GS 1222:2018 is "Health Protection- Requirements for Ambient Noise Control"

GS 1253:2018 is "Acoustic- Guide for Measurement of Outdoor A-Weighted Sound Levels"

3.1.3 Ambient Weather Conditions

The prevailing wind direction during the air quality monitoring periods was from South-West to North-East.

3.2 Discussions

The results show that:

For Dust/ Noxious Gases

- Dust levels in the ambient air ranged from 35.7µgm-^{3} at the Demarcated CMDC Site to 103.9µgm-^{3} at the Main Pit Site for TSP compared with the GS value of 150µgm-^{3} and from 17.1µgm-^{3} at the Alternative CMDC Site to 50.1µgm-^{3} at the Main Pit Site for PM10 compared with the GS value of 70µgm-^{3}. PM2.5 values ranged from 4.8µgm-^{3} at the Alternative CMDC Site to 10.3µgm-^{3} at the Main Pit Site.
- Noxious gases emission was within the respective GS values. SO_2 was 11.141µgm-^{3} at the Alternative CMDC Site to 21.390µgm-^{3} at the Main Pit Site compared with the GS value of 50.0µgm-^{3}, while NO_2 ranged from 0.520µgm-^{3} at the Alternative CMDC Site to 1.490µgm-^{3} at the Demarcated CMDC Site, compared with the GS value of 150.0µgm-^{3}. However, SO_2 was in excess of the WBG Guideline value of 20µgm-^{3} at the Main Pit Site.
- PM10 for the Main Pit Site was in excess of the WHO and WBG Guideline value of 50µgm-^{3} respectively, which may be attributable to the blasting and the movement of motor bikes and tricycles on the dusty road at the Main Pit Site. All the other parameters showed values below the respective WBG and WHO guideline values.
- The prevailing wind direction was from South-West to North-East.

For Noise

- Equivalent Noise Levels (Leq) ranged from 45.8dB(A) at the Alternative CMDC Site to 63.2dB(A) at the Main Pit Site compared with the GS value of 60dB(A) for a mixed use Area and 70dB(A) for WHO Guideline Value (Industrial, Commercial Shopping and Traffic Areas, Indoors and Outdoors) and WBG Guideline Value (Industrial, Commercial).
- The Lmax values recorded ranged from 57.6dB(A) at the Demarcated CMDC Site to 70.5dB(A) at the Main Pit Site.

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

for ambient air quality

- All the other parameters recorded values below the respective WBG and WHO guideline values except at the Main Pit Site for PM_{10} and SO_2 which was above the WBG guidline.
- Thus, TSP $PM_{2.5}$, and NO_2 were all compliant with the respective GS values, WHO Guideline Value and WBG Guideline Value at all the monitoring locations.

for noise levels

- The equivalent noise levels (Leq) at the Demarcated CMDC Site and Alternative CMDC Site were below the GS value of 60dB(A) for the monitoring period except at the Main Pit Site.

4.2 Recommendations

The following recommendations are therefore made:

For Dust/ Noxious Gases

- The ambient air quality should be sustained even during construction or operation and maintenance phase of the mine.

For Noise

- The serene environment in the towns/ villages/ hamlets within the project area should be maintained during construction and mining.

Annex 3-2: Report of Terrestrial Ecology Study

ECOLOGICAL STUDY REPORT FOR TINGA

CONSULTANCY SERVICE FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR TINGA CLEAN MINE DEMONSTRATION CENTRE

SEPTEMBER 2024

Table of Contents

List of Tables

List of Plates

1.0 INTRODUCTION

As part of the ESMP preparation, an ecological study was undertaken to establish the baseline composition of flora and fauna of the subproject area at Tinga.

The ecological survey for the Tinga Clean Mine Demonstration Centre (CMDC) was conducted on 01 August 2024.

1.1 Objective of Assignment

The objective is to conduct terrestrial ecology study within the proposed subproject site of about 0.38ha to monitor the changes in flora and fauna of the subproject area. The study will address structure and composition, focal habitats (i.e. sites important for biodiversity), and focal species, with particular attention paid to the status (abundance and distribution of identified species of conservation concern).

1.2 Scope of the Study

Specifically, the study covered:

- terrestrial flora studies, including comparison of structural characteristics of current and baseline vegetation conditions such as occurrence of large trees and trees known to be important for biodiversity and presence of regeneration, coarse woody debris or deadwood, and other elements specific to the agroecological zone, such as anthills, etc.
- focal habitat sites especially those important for biodiversity e.g. for shelter, feeding or reproduction and monitoring and management recommendations for their maintenance and enhancement. Examples of such sites include wetlands, streams, marshes, etc.
- focal species – status of species of national and regional conservation concern and the level of awareness about occurrence, status, condition, and abundance.
- terrestrial fauna studies to monitor changes in terrestrial fauna of conservation importance in the project area.
- impacts and threats – among others, this should assess presence of trees of commercial or local value, presence of invasive species, evidence of fires, illegal hunting, poisoning, capturing or collecting, vegetation clearance for charcoal production, etc.

- ## 2.0 METHODOLOGY FOR TERRESTRIAL ECOLOGICAL SURVEY

- ### 2.1 Flora Survey

The flora survey was in two parts:

1. Literature Review – relevant literature on the vegetation and ecological characteristics of the subproject affected area was carried out. The literature consulted included Hawthorne and Musah (1995), Hawthorne and Jongkind (2006), Hall and Swaine (1981), Hutchinson and Dalziel (1954-1972), Rose Innes (1977), and Taylor (1960), with the objective of obtaining a general overview of the vegetation and environment of the subproject area.
2. Field survey – A rapid survey was conducted within the subproject site and its external boundaries to obtain an overview of the extent, topography and complexity of the vegetation. A total of 2 quadrat sample plots (20 m x 20 m) were studied in the proposed subproject site. The survey revealed that the subproject site has undulating topography. Species lists were compiled for each sample, and the habitat types determined. The locations of the samples were recorded with a Garmin 64s GPS. Table 1 shows the sample location coordinates and their associated vegetation types.

Table 7: Coordinates of Sampling Locations and Associated Vegetation Types

Sample No.	Latitude (N)	Longitude (W)	Elevation (m.a.s.l)	Description
1	08.56420	002.15360	224	Degraded woodland with isolated trees and mine pits
2	08.57143	002.17217	249	Woodland with open canopy

Table 2 provides a description of the Star Rating System while Table 3 provides a description of the IUCN Red List Categories.

Table 8: Star Rating System

Rating	Description
Black Star species	Species rare internationally and at least uncommon in Ghana; urgent attention to conservation of populations needed
Gold Star species	Fairly rare internationally and/or locally
Blue star species	Widespread internationally but rare in Ghana or vice-versa
Scarlet star species	Common, but under serious pressure from heavy exploitation
Red Star species	Common, but under pressure from exploitation
Pink Star species	Common and moderately exploited. Also, non-abundant species of high potential value
Green Star species	No particular conservation concern, common in Ghana

Table 9: IUCN Red List Categories

Category	Description

Extinct (EX)	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Extinct in the Wild (EW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Critically Endangered (CR)	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	A taxon is endangered when the best available evidence indicates that it meets any of the criteria for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category
Data Deficient (DD)	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking.
Not Assessed (NA)	A taxon is Not yet Assessed when it is has not yet been evaluated against the criteria

- **2.2 Fauna Survey**

The main methods used in the faunal survey were:

- Desk Survey: As part of the desk survey, references were made to available literature including those of Cansdale (1948; 1951), Booth (1958), Schiotz (1969), Hughes and Barry (1969), Decher (1997a), Decher et al. (1997), Kingdon (1997).

- Direct/opportunistic observation and identification of animal spoors: Direct/opportunistic observation involved recording any animal sightings while driving or walking along the main road or animal trails to the areas bordering the proposed subproject site. General walks through the subproject sites to spot animal *spoors* (any sign left by a living animal, such as feeding sites, regular pathways, tracks, footprints, faecal pellets, nests, etc.) were also undertaken. The animals identified were classified as either S.1 or S.2 depending on the degree of protection they enjoy under the national wildlife conservation regulation (Schedules, 1995) as follows:

S.1. (Schedule 1) - The hunting, capturing or destroying of these species is prohibited at all times.
S.2. (Schedule 2) **-** The hunting capturing or destroying of these species is absolutely prohibited between 1st August and 1st December of any season. The hunting, capturing or destroying of any young animal, or adult accompanied by its young, of these species is absolutely prohibited at all times.

- **2.3 Data Analyses**

A total of 2 vegetation samples were taken during the survey. The total number of species encountered in the survey was determined and used in determining the floristic composition of the project site. Floristic analysis (Appendix 2) was carried out to determine the dominant families, life form composition and the ecological guilds of the species. The analysis also included the composition of species in terms of their Star Rating and IUCN threat status. The species list was inspected for alien invasive species.

- **2.4 Survey Limitations**

Complete flora and fauna surveys require multiple surveys at different times of the year and over a number of years to enable observations of all species present. Some flora, such as annuals, are available for collection at certain times of the year (e.g., when they are flowering). Climatic and other events (human disturbances like clearing, fires) may affect the presence of species.

- **3.0 RESULTS OF THE TERRESTRIAL ECOLOGICAL SURVEY**

- **3.1 Flora Survey**

- 3.1.1 Regional Context

The project area, Tinga in the Bole District of the Savanna Region, lies in the northern Guinea Savanna vegetation zone of Ghana (Taylor, 1960; Innes, 1977). This vegetation is characterised by a continuous grassy ground layer with an open canopy tree stratum. The vegetation is thus open in several places. The ground layer is annually or periodically burnt. Parts of the area have been intensively farmed.

The vegetation of this zone is characterised by trees such as *Parkia biglobosa*, *Vitellaria paradoxa, Burkea africana, Daniellia oliveri, Afzelia africana, Parinari polyandra, Hymernocardia acida, Vitex doniana, Terminalia glaucescens, Lophira lanceolata, Piliostigma thonningii* and *Diospyros mespiliformes*. The common grasses of the Guinea Savanna-Woodland are *Andropogon* sp., *Brachiaria brevis, Digitaria gayana, Eleusine indica, Eragrostis aspera, Hyparrhenia* sp., *Pennisetum pedicellatum, Schizachyrium* sp., *Rottboellia* sp., *Cymbopogon giganteus* and *Panicum* sp. Places that are heavily farmed and thus of low fertility usually have short wiry grass species e.g. *Aristidia kerstingii, Ctenium elegans, Schoenefeldia gracilis, Schizachyrium exile, Hyparrhenia* sp. and *Monocymbium ceresiiforme*.

Table 4 shows some tree species and conservation status of the dry semi-deciduous zone.

Table 10: Characteristic tree species of Dry Semi-deciduous (Inner Zone subtype) and their conservation statuses (after Taylor, 1960)

Characteristic Species	**IUCN Threat Status**	**Star Rating**
Vitellaria paradoxa	VU	NA
Azelia Africana	VU	Red
Vitex doniana	LC	NA
Diospyros mespiliformis	LC	Green
Daniellia oliveri	LC	Green
Parkia biglobosa	LC	NA
Lophira lanceolata	LC	NA
Burkea Africana	LC	NA

…..Vulnerable (VU), Least Concern (LC)

- 3.1.2 Habitat Types in the Project Site

The subproject site has a gently undulating topography with well drained soils. Most of the area has been mined out. The CMDC site at Tinga is close to the mined-out areas showing degraded landscape with mined out pits and isolated trees while some portions of the area has open canopy woodland and secondary thickets vegetation (Plates 1 to 3).

The open canopy woodland and secondary thickets (Plate 1) have tree species such as *Vitellaria paradoxa, Combretum adenogonium, Daniellia oliveri, Afzelia africana, Nauclea latifolia, Parkia biglobosa and Vitellaria paradoxa*. The shrubs and herbs common to the site include *Cassia mimosoides, Cleome viscosa, Hyptis suaveolens, Sporobolus robusta* and *Tephrosia elegans*.

Plate 5: Open canopy woodland with shrub and herb undergrowth at Tinga Proposed CMDC

Plate 6: Major Mining Pit at Tinga Near Proposed CMDC Site

Plate 7: Background Settlement in the Mining Area with Isolated Trees at Tinga CMDC Site

- 3.1.3 Floristic Analysis

The species list compiled for the 2 samples is presented in Appendix 2. The survey recorded 28 species in 26 genera belonging to 14 families of flowering plants. The dominant families were the Fabaceae (7), Poaceae (5) and Combretaceae (3). These three families accounted for about 54% of the species recorded. All other families had less than 3 species present. The vegetation of the site is low in species diversity due to the mining activities which have left several areas degraded.

The life form composition of the flora is presented in Table 5. Trees constituted the dominant life form (50%) in the project's area of influence followed by the Herbs and Shrubs with 25% each. No climbers were recorded at the project site.

Table 11: Life Form Composition of the Project Site

Life Form	**No of Species**	%
Climber	0	0.0
Herb	7	25.0
Shrub	7	25.0
Tree	14	50.0
Total	39	100.0

- 3.1.4 Species of Conservation Concern in the Subproject Area

About 95% of the species encountered are of no immediate conservation concern in Ghana i.e. Green Star and Not Evaluated (NE) species.

Two (2) species of conservation concern in Ghana were recorded during the survey viz., *Afzelia africana* (Red Star, VU) and *Vitellaria paradoxa* (VU). The Red Star species are common but under pressure from exploitation while the Blue Star species are rare in Ghana and are faced with habitat decline. According to the IUCN threatened species categories (IUCN, 2024), *Afzelia africana* and *Vitellaria paradoxa* are Vulnerable species and require urgent conservation action.

- 3.1.5: Alien Invasive Species

No alien invasive species was recorded at the Tinga subproject area.

- **3.2 Fauna Survey**

The faunal list of the subproject area is based on the information gathered from various methods (interviews, desk surveys and direct observations), is presented in Appendix 3. According to the hunters interviewed, most of the large mammals which were common in the area have moved further away into the Mole National Park due to human activities such as farming, grazing and mining. Notable among

these are the elephant, lion, leopard, warthog, several parrots, terns, songbirds (passerines), land tortoises, pythons and other snakes, lizards, bats, birds of prey, mongooses, bovids (e.g. the African buffalo and several duikers), egrets, ducks and pigeons. A number of the species known to occur in the area are of both national and global (IUCN, CITES) conservation significance.

- **4.0 CONCLUSIONS AND RECOMMENDATIONS**

The results of the survey indicate that the subproject area is human modified habitat. Small scale mining in the project area has led to a decline in the quality of vegetation and loss of flora and faunal species diversity.

The subproject will have no significant impact on the existing vegetation or fauna of the subproject site.

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APPENDICES

Appendix 1

Tinga Mine site
Degraded woodland with isolated trees and mine pits around CMDC Site
N08.56420
W002.15360
Elevation: 224m
Photo: 3612 - 3615
Daniellia oliveri
Vitellaria paradoxa
Cassia occidentalis
Parkia biglobosa
Brachiaria lata
Gomphrena celosioides
Dactyloctenium aegyptium
Afzelia africana
Sclerocarya birrea
Hyptis suaveolens
Combretum glutinosum
Eleusine indica
Terminalia avicennioides
Nauclea latifolia
Crossopteryx febrifuga
Hyptis suaveolens
Lannea acida
Flueggea virosa
Maytenus sp
Cleome viscosa
Combretum adenogomiium
Calotropis procera
Piliostigma thonningii
Sporobulus robusta

Tinga Alternative CMDC Site
Woodland with open canopy
N08.57143
W002.17217
Elevation 249m
Photo: 3619 - 3621
Vitellaria paradoxa
Terminalia avicennioides
Flueggea virosa
Daniellia oliveri
Nauclea latifolia
Tephrosia pedicellata
Sclerocarya birrea
Strychnos spinosa
Combretum glutinosum
Borassus aethiopum
Lannea acida

Parkia biglobosa
Cenchrus biflorus
Cassia mimosoides

Appendix 2

Species	Family	Life Form	Star Rating	IUNC
Afzelia africana	Fabaceae	Tree	Red	VU
Borassus aethiopum	Arecaceae	Tree	NE	LC
Brachiaria lata	Poaceae	Herb	NE	NE
Calotropis procera	Apocynaceae	Shrub	NE	NE
Cassia mimosoides	Fabaceae	Shrub	NE	LC
Cassia occidentalis	Fabaceae	Shrub	NE	NE
Cenchrus biflorus	Poaceae	Herb	NE	NE
Cleome viscosa	Cleomaceae	Shrub	NE	NE
Combretum adenogomiium	Combretaceae	Tree	NE	LC
Combretum glutinosum	Combretaceae	Tree	NE	LC
Crossopteryx febrifuga	Rubiaceae	Tree	NE	LC
Dactyloctenium aegyptium	Poaceae	Herb	NE	NE
Daniellia oliveri	Fabaceae	Tree	NE	LC
Eleusine indica	Poaceae	Herb	NE	NE
Flueggea virosa	Phyllanthaceae	Shrub	NE	LC
Gomphrena celosioides	Amaranthaceae	Herb	NE	NE
Hyptis suaveolens	Lamiaceae	Herb	NE	NE
Lannea acida	Anacardiaceae	Tree	NE	LC
Maytenus senegalensis	Celastraceae	Tree	NE	NE
Nauclea latifolia	Rubiaceae	Tree	NE	LC
Parkia biglobosa	Fabaceae	Tree	NE	LC
Piliostigma thonningii	Fabaceae	Shrub	NE	NE
Sclerocarya birrea	Anacardiaceae	Tree	NE	NE
Sporobulus robusta	Poaceae	Herb	NE	NE
Strychnos spinosa	Loganiaceae	Tree	NE	NE
Tephrosia elegans	Fabaceae	Shrub	NE	NE
Terminalia avicennioides	Combretaceae	Tree	NE	LC
Vitellaria paradoxa	Sapotaceae	Tree	NE	VU

Appendix 3: Fauna of the Tinga Subproject Area					
Order	**Name**		**Conservation Significance**		**Abundance Status**
	Common	**Species**	**IUCN**	**National**	
Artiodactyla *(Even-toed ungulates)*	Bushbuck	*Tragelaphus scriptus*	LC	II	Rare
	Common Duiker	*Sylvicapra grimmia*	LC	II	Rare
	Oribi	*Ourebia ourebi*	LC	II	Rare
	Red River Hog	*Potamochoerus porcus*	LC	II	Rare
Canivora *(Carnivores)*	African Civet	*Civettictis civetta*	LC	II	Rare
	Common Slender Mongoose	Herpestes sanguineus	LC	II	Common
	Common Kusimanse	*Crossarchus obscurus*	LC	II	Common
	Marsh Mongoose	*Atilax paludinosus*	LC	II	Common
Lagomorpha	African Savanna Hare	*Lepus microtis*	LC	Not Listed	Common
Primata	Olive Baboon	*Papio anubis*	LC	II	Common
	Gambian Pouched Rat	*Cricetomys gambianus*	LC	Not Listed	Common
	Grasscutter	*Thryonomys swinderianus*	LC	Not Listed	Common
	Gambian sun squirrel	*Heliosciurus gambianus*	LC	Not Listed	
	Guinea multimammate mouse	*Mastomys erythroleucus*	LC	Not Listed	
	Stripped Ground Squirrel	*Euxerus erythropus*	LC	Not Listed	Abundant
Anura (Frogs and Toads)	Common Frog	*Amnirana galamensis*	LC	Not listed	
	Common Toad	*Sclerophrys regularis*	LC	Not listed	
	Crowned Bull Frog	*Hoplobatrachus occipitalis*	LC	Not listed	
Squamata	Agama Lizard	*Agama agama*	LC	Not listed	
(*Snakes and Lizards*)	African Rock Python	*Python sebae*	NT	II	
	Boomslang	*Dispholidus typus*	LC	Not listed	
	Forest Cobra	*Naja melanoleuca*	LC	Not listed	
	Gaboon Viper	*Bitis gabonica*	LC	Not listed	
	Hissing Sandsnake	*Psammophis sibilans*	LC	Not listed	
	Night Adder	Causus rhombeatus	LC	Not listed	
	Nile Monitor	*Varanus niloticus*	LC	I	
	Puff Adder	*Night Adder*	LC	Not listed	
	Savanna Monitor	Varanus exanthematicus	LC	Not listed	
	Spitting cobra	*Naja nigricollis*	LC	Not listed	
Accipitriformes	Black Kite	*Milvus migrans*	LC	I	
	Shikra	*Accipiter badius*	LC	I	
	Lizard Buzzard	*Kaupifalco monogrammicus*	LC	I	

Bucerotiformes	African Grey Hornbill	*Lophoceros nasutus*	LC	Not listed	
	West African Pied Hornbill	*Lophoceros semifasciatus*	LC	Not listed	
	Spur-winged lapwing	*Vanellus spinosus*	LC	Not listed	
Columbiformes	Laughing Dove	*Spilopelia senegalensis*	LC	II	
	Red-Eyed Dove	*Streptopelia semitorquata*	LC	II	
Cuculiformes	Levaillant's cuckoo	*Clamator levaillantii*	LC	Not listed	
	Senegal Coucal	*Centropus senegalensis*	LC	Not listed	
Galliformes	Double-spurred Spurfowl	*Pternistis bicalcaratus*	LC	II	
	Stone Partridge	*Ptilopachus petrosus*	LC	II	
	Western Grey Plantain-eater	*Crinifer piscator*	LC	Not listed	
Passeriformes	African Blue Flycatcher	*Elminia longicauda*	LC	Not listed	
	African Pied Wagtail	*Motacilla aguimp*	LC	Not listed	
	Black-crowned Tchagra	*Tchagra senegalus*	LC	Not listed	
	Bronze Mannikin	*Permestes cucullata*	LC	Not listed	
	Common Bulbul	*Pycnonotus barbatus*	LC	Not listed	
	Long-tailed Glossy Starling	*Lamprotornis caudatus*			
	Long-tailed nightjar	*Caprimulgus climacurus*	LC	Not listed	
	Melodious Warbler	*Hippolais polyglotta*			
	Northern Grey-headed Sparrow	*Passer griseus*	LC	Not listed	
	Orange-Cheeked Waxbill	*Estrilda melpoda*	LC	Not listed	
	Red-breasted swallow	*Cecropis semirufa*	LC	Not listed	
	Village Weaver	*Ploceus cucullatus*	LC	Not listed	
	White-fronted Black Chat	*Oenanthe albifrons*	LC	Not listed	
Pelecaniformes	Cattle Egret	*Bubulcus ibis*	LC	I	

Annex 4-1: Stakeholder Engagement Results

List of Persons Contacted and Key Issues Raised

No.	Location/ Venue	Person Contacted	Date Engaged	Issues/Concerns Raised	Responses Provided
1	Tinga	• Haki abdulahi, Mine Owner (0542384898) • Mustapha Kwesi, Mine Owner (0549293687)	10/08/2024	• The Tinga Wenchi community mine is an artisanal underground mine that mines hard rock deposit. • This process requires drilling of holes in the rock and feeding these holes with explosives. • The charged rocks are then exploded and the gold ore deposits are conveyed to the surface by men, known as "loco boys" for onward processing. • The profitability of the operation to a large extent depended on their geographical knowledge of the ore bearing rocks. • A lot of miners have acquired respiratory conditions from the site, hence cough is prevalent. • Suggest that security should be beefed up by introducing police visibility and equipping the police with the requisite logistics. • Advised that local people should be trained to operate the center in order to ensure success of the program • Would like to know what happens to the owners of CHANG FA crushers and their operators since they will be out of business.	The PIU will present concerns to the authorities for redress concerning what happens to owners of Chang Fa Machines
2		• Seidu Ibrahim, Committee Member (0240673172) • Kalsum Zakari, Committee Member (0246333063)		• The Minerals Commission should consider opening an office in the area to facilitate speedy processing of document required by prospective miners, instead of doing everything in the capital. • Would like to whether the new extraction method being proposed can extract more gold than using mercury. • Similar projects have failed in the past; implementers of this project should eschew all forms of cronyism and favoritism.	The PIU will present concerns to the Minerals Commission concerning they opening an office in Dakrupe or the District
3		Women in Mining • Doris Anjuti (053247710) • Ajara adams (0555611581)	10/08/2024	• Women undertake some of the most critical aspects of the production chain yet they are among the least paid. • Complain about exploitation by buyers and their male counterparts, which stems from the fact that they are not educated enough to be able to benefit fully from	More women should be encouraged to work in the mining sector and their capacities should be built

No.	Location/ Venue	Person Contacted	Date Engaged	Issues/Concerns Raised	Responses Provided
		• Doris Yiweni (0249370338) • Portia Nordah (0537446135) • Sophia Yiweni (0597380078) • Florence Nunobil (0537793825)		the venture. Their lack of knowledge about effective mining techniques leads to lost earnings. • Since most of the women are burdened with the responsibility of fending for their children, they tend to accept any offer, further impoverishing them. • A few of the women noted that they were engaged with other economic activities before venturing into mining. • They indicated that mining seems to be the most lucrative venture under the current circumstances. During this engagement it was noted that almost 90% of the women depend solely on mining for their livelihood. • They also have insufficient social protection mechanisms to financially safeguard themselves and their families. • They admit that they are not well organized or mobilized in a group • They complained about the lack of childcare and sanitation facilities at the site • They admit working with mercury which exposes them to substantial health risk; they sometimes keep the mercury at home and this endangers the health of their families and their community. • Would like to know if the demonstration center will charge them for the milling lode. • Suggests that security needs to be improved at the site to prevent stealing of wares. • Also sked for proper places of convenience to be constructed to help with the hygiene of the site	
4	Bole	• Mr. Eddie Telley, CEO, Partners in Participatory Development (0244723498)	10/08/2024	• The NGO was established some 25 years ago. The organization is into advocacy of girl child education, reproductive health issues and environmental sustainability. • Applauds the importance of such a project and underscored its importance at such a crucial time when environmental degradation is being attributed to mining. • Noted that the severity of mercury use depended on the type of mining being practiced. • Was of the opinion that the Tinga community mining program used less mercury due to the underground mining being practiced there.	Hopefully, there will be more education of the miners on Environment, Health and Safety issues

No.	Location/ Venue	Person Contacted	Date Engaged	Issues/Concerns Raised	Responses Provided
				• Noted that in areas where there was open pit mining the use of mercury tended to be more and the extent of degradation was vast . • Mentioned that the use of mercury is pervasive as a result of ignorance of its very toxic nature and the unavailability of an alternative to mercury. • Indicated that with intensive sensitization and education, the miners will cone to terms with the harmful attributes of mercury. • Sated that an alternative must be made easily accessible si as to forestall the use of mercury.	
5	Bole	Ghana Education Service	08/08/2024	• Not only are the education facilities not well distributed, some of the structures are but run down. A number of primary school buildings in the District are three unit classroom blocks. This necessitated the holding of multi-grade classes which affects quality of teaching and learning. • This state of affairs has two implications: firstly, pupils from communities without JHSs have to travel longer distances to other communities with JHSs and for a considerable number of them, it marks the end of their education; secondly, JHSs will be overcrowded since they serve many primary schools.. • The school building needs to be renovated to make learning attractive to children of school going age and deter them from galamsey.	The PIU may take up the community need on education for consideration by the responsible authorities
6	Bole	District Planning Officer (Edmund Zoure)	08/08/2024	• Settlement structure of the district is the Semi-Clustered type of settlement. The settlements vary in size and type; they range from hamlets to urban settlements. • There are five urban communities with population above 5000 which are classified as first level settlements. These are Bole, Bamboi, Tinga, Banda Nkwanta and Jama. The second level settlements are Mankuma, Maluwe, Mandari, Teslima and carpenter with populations of 2000 and above but not up to 5000. The rest are rural communities and hamlets. • The rural communities are basically bases of primary economic activities, whereas the urban settlements derive their life support from processing of agric produce, serve as marketing centres and provide other support services. • Major problems are non-adherence to planning regulations, encroachment on government lands and open spaces, non-enforcement of byelaws and	The assembly has a major role to play in the subproject and will be consulted regularly to ensure success of the subproject

No.	Location/ Venue	Person Contacted	Date Engaged	Issues/Concerns Raised	Responses Provided
				unavailability of settlement plans and layouts. Open defecation is also a threat to healthy living in the communities. • Had knowledge of the project and expressed optimism about the success of the project in addressing the mercury menace in mining in the district. • Assured the readiness of the district to cooperate and assist in any way the assembly could. • Would like to know what becomes of the miners who derive their entire livelihood from mining in the community especially the women who do some sort of primary crushing at the various sites.	
7	Bole	District Directorate, Agriculture (Mr Sualey Abukari)	08/08/2024	• Farmers will only produce beyond subsistence when their products are assured of good market. Lack of access to markets and storage facilities can lead to post-harvest losses as far as perishable produce are concern. • The markets in the district are few and far apart. This increases transportation cost to and from the market and hence the cost of items in general. • Extension delivery to farmers is limited because of the few numbers of AEAs attending to several farmers. The number of AEAs required to deliver efficient and effective extension service is in sharp contrast to the number at post. • Though officers are few, most farmers had their fields and homes visited for extension delivery. • Environmental management is essential to sustain continuous farming. AEAs and farmers were trained on safety use of chemicals. • Does not seem to have any knowledge of such project happening in his catchment area. However after briefing him about the Project he was really excited that a project of such magnitude was going to be set up in the district. He asked how soon the project will take off. He observed that most farmers have abandoned farming and have become miners due to the continuous low yeild	There is need to ensure that mining does not thrive to the detriment of farming which may result in famine in the subproject area

Photo Plate 1: Photos of Stakeholder Engagement Activities






Annex 7-1: Sample Code of Conduct Forms

Code of Conduct for Preventing Sexual Exploitation and Abuse and Sexual Harassment and Violence Against Children

A). Company Code of Conduct Preventing Sexual Exploitation and Abuse and Violence Against Children

The company is committed to creating and maintaining an environment in which gender-based violence (SEA/SH) and violence against children (VAC) have no place, and will not be tolerated by any employee, associate, or representative of the company. Therefore, in order to ensure that all those engaged in the project are aware of this commitment, and in order to prevent, be aware of, and respond to any allegations of SEA/SH and VAC, the company commits to the following core principles and minimum standards of behaviour that will apply to all company employees, associates, and representatives including sub-contractors, without exception:

1. The company — and therefore all employees, associates, and representatives — commit to treating women, children (persons under the age of 18), and men with respect regardless of race, colour, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status. Acts of SEA/SH and VAC are in violation of this commitment.
2. Demeaning, threatening, harassing, abusive, culturally inappropriate, or sexually provocative language and behaviour are prohibited among all company employees, associates, and its representatives.
3. Acts of SEA/SH or VAC constitute gross misconduct and are therefore grounds for sanctions, which may include penalties and/or termination of employment. All forms of SEA/SH and VAC, including grooming are unacceptable, regardless of whether they take place on the work site, the work site surroundings, at worker's camps or at worker's homes.
4. In addition to company sanctions, legal prosecution of those who commit acts of SEA/SH or VAC will be pursued if appropriate.
5. Sexual contact or activity with children under 18—including through digital media and use of children as construction labour —is prohibited. Mistaken belief regarding the age of a child is not a defines. Consent from the child is also not a defines or excuse.
6. Sexual favours—for instance, making promises or favourable treatment dependent on sexual acts—or other forms of humiliating, degrading or exploitative behaviour are prohibited.
7. Unless there is full consent[1] by all parties involved in the sexual act, sexual interactions between the company's employees (at any level) and members of the communities surrounding the work place are prohibited. This includes relationships involving the withholding/promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex—such sexual activity is considered "non-consensual" within the scope of this Code.
8. All employees, including volunteers and sub-contractors are highly encouraged to report suspected or actual acts of SEA/SH and/or VAC by a fellow worker, whether in the same company or not. Reports must be made in accordance with SEA/SH and VAC Allegation Procedures.

Consent is defined as the informed choice underlying an individual's free and voluntary intention, acceptance or agreement to do something. No consent can be found when such acceptance or agreement is obtained through the use of threats, force or other forms of coercion, abduction, fraud, deception, or misrepresentation. In accordance with the United Nations Convention on the Rights of the Child, the World Bank considers that consent cannot be given by children under the age of 18, even in the event that national legislation of the country into which the Code of Conduct is introduced has a lower age. Mistaken belief regarding the age of the child and consent from the child is not a defense.

9. Managers are required to report suspected or actual acts of SEA/SH and/or VAC as they have a responsibility to uphold company commitments and hold their direct reports responsible.

To ensure that the above principles are implemented effectively the company commits to ensuring that:

10. All managers sign the 'Manager's Code of Conduct' detailing their responsibilities for implementing the company's commitments and enforcing the responsibilities in the 'Individual Code of Conduct'.
11. All employees sign the project's 'Individual Code of Conduct' confirming their agreement not to engage in activities resulting in SEA/SH or VAC.
12. Displaying the Company and Individual Codes of Conduct prominently and in clear view at workers' camps, offices, and in in public areas of the work space. Examples of areas include waiting, rest and lobby areas of sites, canteen areas, health clinics.
13. Ensure that posted and distributed copies of the Company and Individual Codes of Conduct are translated into the appropriate language of use in the work site areas as well as for any international staff in their native language.
14. An appropriate person is nominated as the company's 'Focal Point' for addressing SEA/SH and VAC issues, including representing the company on the SEA/SH and VAC Compliance Team which is comprised of representatives from the client, contractor(s), the supervision consultant, and local service provider(s).
15. Ensuring that an effective Action Plan is developed in consultation with the Compliance Team which includes as a minimum:

    a. **SEA/SH and VAC Allegation Procedure** to report SEA/SH and VAC issues through the project Grievance Redress Mechanism (GRM);
    b. **Accountability Measures** to protect confidentiality of all involved; and,
    c. **Response Protocol** applicable to SEA/SH and VAC survivors and perpetrators.

16. That the company effectively implements the Action Plan, providing feedback to the SEA/SH and VAC Compliance Team for improvements and updates as appropriate.
17. All employees attend an induction training course prior to commencing work on site to ensure they are familiar with the company's commitments and the project's SEA/SH and VAC Codes of Conduct.
18. All employees attend a mandatory training course once a month for the duration of the contract starting from the first induction training prior to commencement of work to reinforce the understanding of the project's SEA/SH and VAC Code of Conduct.

I do hereby acknowledge that I have read the foregoing Company Code of Conduct, and on behalf of the company agree to comply with the standards contained therein. I understand my role and responsibilities to prevent and respond to SEA/SH and VAC. I understand that any action inconsistent with this Company Code of Conduct or failure to take action mandated by this Company Code of Conduct may result in disciplinary action.

Company name: _____

Signature: _____

Printed Name: _____

Title: _____

Date: _____

B). Manager's Code of Conduct Preventing Sexual Exploitation and Abuse, Sexual Harassment

Managers at all levels have particular responsibilities to uphold the company's commitment to preventing and addressing SEA/SH and Violence Against Children (VAC). This means that managers have an acute responsibility to create and maintain an environment that prevents SEA/SH and VAC. Managers need to support and promote the implementation of the Company Code of Conduct. To that end, managers must adhere to this Manager's Code of Conduct and also sign the Individual Code of Conduct. This commits them to supporting and developing systems that facilitate the implementation of the Action Plan and maintain a SEA/SH-free and VAC-free environment at the workplace and in the local community. These responsibilities include but are not limited to:

Implementation

1. To ensure maximum effectiveness of the Company and Individual Codes of Conduct:
    a. Prominently displaying the Company and Individual Codes of Conduct in clear view at workers' camps, offices, and in in public areas of the work space. Examples of areas include waiting, rest and lobby areas of sites, canteen areas, health clinics.
    b. Ensuring all posted and distributed copies of the Company and Individual Codes of Conduct are translated into the appropriate language of use in the work site areas as well as for any international staff in their native language.
2. Verbally and in writing explain the Company and Individual Codes of Conduct to all staff.
3. Ensure that:
    a. All direct reports sign the 'Individual Code of Conduct', including acknowledgment that they have read and agree with the Code of Conduct.
    b. Staff lists and signed copies of the Individual Code of Conduct are provided to the client.
    c. Participate in training and ensure that staff also participate as outlined below.
    d. Staff are familiar with the Grievance Redress Mechanism (GRM) and that they can use it to anonymously report concerns of SEA/SH or VAC incidents.
    e. Staff are encouraged to report suspected or actual SEA/SH or VAC through the GRM by raising awareness about SEA/SH and VAC issues, emphasizing the staff's responsibility to the Company and the country hosting their employment, and emphasizing the respect for confidentiality.
4. In compliance with applicable laws and to the best of your abilities, prevent perpetrators of sexual exploitation and abuse from being hired, re-hired or deployed. Use background and criminal reference checks for all employees.
5. Ensure that when engaging in partnership, sub-contractor or similar agreements, these agreements:
    a. Incorporate the SEA/SH and VAC Codes of Conduct as an attachment.
    b. Include the appropriate language requiring such contracting entities and individuals, and their employees and volunteers, to comply with the Individual Codes of Conduct.
    c. expressly state that the failure of those entities or individuals, as appropriate, to take preventive measures against SEA/SH and VAC, to investigate allegations thereof, or to take corrective actions when SEA/SH or VAC has occurred, shall constitute grounds for sanctions and penalties in accordance with the Individual Codes of Conduct.
6. Provide support and resources to the SEA/SH and VAC Team to create and disseminate internal sensitization initiatives through the awareness-raising strategy under the Action Plan.
7. Ensure that any SEA/SH or VAC issue warranting police action is reported to the client and the World Bank immediately.

Training

8. All managers are required to attend an induction manager training course prior to commencing work on site to ensure that they are familiar with their roles and responsibilities in upholding the SEA/SH and VAC Codes of Conduct. This training will be separate from the induction training course required of all employees and will provide managers with the necessary understanding

and technical support needed to begin to develop the Action Plan for addressing SEA/SH and VAC issues.

9. Ensure that time is provided during work hours and that staff attend the mandatory project facilitated induction training on SEA/SH and VAC required of all employees prior to commencing work on site.
10. Ensure that staff attend the monthly mandatory refresher training course required of all employees to combat increased risk of SEA/SH and VAC during civil works.
11. Managers are required to attend and assist with the project facilitated monthly training courses for all employees. Managers will be required to introduce the trainings and announce the self-evaluations.
12. Collect satisfaction surveys to evaluate training experiences and provide advice on improving the effectiveness of training.

Response

13. Managers will be required to provide input to the SEA/SH and VAC Allegation Procedures and Response Protocol developed by the SEA/SH and VAC Team as part of the final cleared Action Plan.
14. Once adopted by the Company, managers will uphold the Accountability Measures set forth in the Action Plan to maintain the confidentiality of all employees who report or (allegedly) perpetrate incidences of SEA/SH and VAC (unless a breach of confidentiality is required to protect persons or property from serious harm or where required by law).
15. If a manager develops concerns or suspicions regarding any form of SEA/SH or VAC by one of his/her direct reports, or by an employee working for another contractor on the same work site, s/he is required to report the case using the GRM.
16. Once a sanction has been determined, the relevant manager(s) is/are expected to be personally responsible for ensuring that the measure is effectively enforced, within a maximum timeframe of 14 days from the date on which the decision to sanction was made.
17. Managers failing to report or comply with such provision can in turn be subject to disciplinary measures, to be determined and enacted by the company's Chief Executive Officer, Managing Director or equivalent highest-ranking manager. Those measures may include:
    a. Informal warning.
    b. Formal warning.
    c. Additional Training.
    d. Loss of up to one week's salary.
    e. Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months.
    f. Termination of employment.
18. Ultimately, failure to effectively respond to SEA/SH and VAC cases on the work site by the company's managers or Chief Executive Officer may provide grounds for legal actions by authorities.

I do hereby acknowledge that I have read the foregoing Manager's Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to SEA/SH and VAC. I understand that any action inconsistent with this Manager's Code of Conduct or failure to take action mandated by this Manager's Code of Conduct may result in disciplinary action.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

C). Individual Code of Conduct Preventing Sexual Exploitation and Abuse and Sexual Harassment and Violence Against Children

I, _____, acknowledge that preventing gender-based violence (SEA/SH) and violence against children (VAC) is important. The company considers that SEA/SH or VAC activities constitute acts of gross misconduct and are therefore grounds for sanctions, penalties or potential termination of employment. All forms of SEA/SH or VAC are unacceptable be it on the work site, the work site surroundings, or at worker's camps. Prosecution of those who commit SEA/SH or VAC may be pursued if appropriate.

I agree that while working on the project I will:

- Consent to police background check.
- Treat women, children (persons under the age of 18), and men with respect regardless of race, colour, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status.
- Not use language or behaviour towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
- Not participate in sexual contact or activity with children—including grooming, or contact through digital media. Mistaken belief regarding the age of a child is not a defence. Consent from the child is also not a defence or excuse.
- Not engage in sexual favours—for instance, making promises or favourable treatment dependent on sexual acts—or other forms of humiliating, degrading or exploitative behaviour.
- Unless there is the full consent[2] by all parties involved, I will not have sexual interactions with members of the surrounding communities. This includes relationships involving the withholding or promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex—such sexual activity is considered "non-consensual" within the scope of this Code.
- Attend and actively partake in training courses related to HIV/AIDS, SEA/SH and VAC as requested by my employer.
- Consider reporting through the GRM or to my manager any suspected or actual SEA/SH or VAC by a fellow worker, whether employed by my company or not, or any breaches of this Code of Conduct.

With regard to children under the age of 18:

- Wherever possible, ensure that another adult is present when working in the proximity of children.
- Not invite unaccompanied children unrelated to my family into my home, unless they are at immediate risk of injury or in physical danger.
- Not sleep close to unsupervised children unless absolutely necessary, in which case I must obtain my supervisor's permission, and ensure that another adult is present if possible.
- Use any computers, mobile phones, or video and digital cameras appropriately, and never to exploit or harass children or to access child pornography through any medium (see also "Use of children's images for work related purposes" below).
- Refrain from physical punishment or discipline of children.

[2] **Consent** is defined as the informed choice underlying an individual's free and voluntary intention, acceptance or agreement to do something. No consent can be found when such acceptance or agreement is obtained through the use of threats, force or other forms of coercion, abduction, fraud, deception, or misrepresentation. In accordance with the United Nations Convention on the Rights of the Child, the World Bank considers that consent cannot be given by children under the age of 18, even in the event that national legislation of the country into which the Code of Conduct is introduced has a lower age. Mistaken belief regarding the age of the child and consent from the child is not a defense.

- Refrain from hiring children for domestic or other labour which is inappropriate given their age or developmental stage, which interferes with their time available for education and recreational activities, or which places them at significant risk of injury.
- Comply with all relevant local legislation, including labour laws in relation to child labour.

Use of children's images for work related purposes

When photographing or filming a child for work related purposes, I must:

- Before photographing or filming a child, assess and endeavour to comply with local traditions or restrictions for reproducing personal images.
- Before photographing or filming a child, obtain informed consent from the child and a parent or guardian of the child. As part of this I must explain how the photograph or film will be used.
- Ensure photographs, films, videos and DVDs present children in a dignified and respectful manner and not in a vulnerable or submissive manner. Children should be adequately clothed and not in poses that could be seen as sexually suggestive.
- Ensure images are honest representations of the context and the facts.
- Ensure file labels do not reveal identifying information about a child when sending images electronically.

Sanctions

I understand that if I breach this Individual Code of Conduct, my employer will take disciplinary action which could include:

- Informal warning.
- Formal warning.
- Additional Training.
- Loss of up to one week's salary.
- Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months.
- Termination of employment.
- Report to the police if warranted.

I understand that it is my responsibility to avoid actions or behaviours that could be construed as SEA/SH or VAC or breach this Individual Code of Conduct. I do hereby acknowledge that I have read the foregoing Individual Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to SEA/SH and VAC. I understand that any action inconsistent with this Individual Code of Conduct or failure to take action mandated by this Individual Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

RAISING CONCERNS

If any person observes behaviours that he/she believes may represent a violation of this Code of Conduct, or that otherwise concerns him/her, he/she should raise the issue promptly. This can be done in either of the following ways:

1. Contact [*enter name of the Contractor's Social Expert with relevant experience in handling gender-based violence, or if such person is not required under the Contract, another individual designated by the Contractor to handle these matters*] in writing at this address [ ] or by telephone at [ ] or in person at [ ]; or
2. Call [ ] to reach the Contractor's hotline *(if any)* and leave a message.

The person's identity will be kept confidential, unless reporting of allegations is mandated by the country law. Anonymous complaints or allegations may also be submitted and will be given all due and appropriate consideration. We take seriously all reports of possible misconduct and will investigate and take appropriate action. We will provide warm referrals to service providers that may help support the person who experienced the alleged incident, as appropriate.

There will be no retaliation against any person who raises a concern in good faith about any behaviour prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

CONSEQUENCES OF VIOLATING THE CODE OF CONDUCT

Any violation of this Code of Conduct by Contractor's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

FOR CONTRACTOR'S PERSONNEL:

I have received a copy of this Code of Conduct written in a language that I comprehend. I understand that if I have any questions about this Code of Conduct, I can contact [*enter name of Contractor's contact person(s) with relevant experience]* requesting an explanation.

Name of Contractor's Personnel: [insert name]

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Contractor:

Signature: _____

Date: (day month year): _____

Behaviours constituting Sexual Exploitation and Abuse (SEA) and behaviours constituting Sexual Harassment (SH).

The following non-exhaustive list is intended to illustrate types of prohibited behaviours.

(1) **Examples of sexual exploitation and abuse** include, but are not limited to:

- A Contractor's Personnel tells a member of the community that he/she can get them jobs related to the work site (e.g. cooking and cleaning) in exchange for sex.

- A Contractor's Personnel that is connecting electricity input to households says that he can connect women headed households to the grid in exchange for sex.
- A Contractor's Personnel rapes, or otherwise sexually assaults a member of the community.
- A Contractor's Personnel denies a person access to the Site unless he/she performs a sexual favour.
- A Contractor's Personnel tells a person applying for employment under the Contract that he/she will only hire him/her if he/she has sex with him/her.

(2) **Examples of sexual harassment in a work context**

- Contractor's Personnel comment on the appearance of another Contractor's Personnel (either positive or negative) and sexual desirability.
- When a Contractor's Personnel complains about comments made by another Contractor's Personnel on his/her appearance, the other Contractor's Personnel comment that he/she is "asking for it" because of how he/she dresses.
- Unwelcome touching of a Contractor's or Employer's Personnel by another Contractor's Personnel.

A Contractor's Personnel tells another Contractor's Personnel that he/she will get him/her a salary raise, or promotion if he/she sends him/her naked photographs of himself/her